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Medical News

The Journal of the
American Medical Profession



The Toxicity of Combustion Gases

Stephen Hales, Father of Hemodynamics

Medical Book News

Editorials

Contemporary Progress

Vol. 72

No. 11

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EDITORIALS

MICHAEL HOKE

A GREAT bone and joint surgeon has passed. Dr. Michael Hoke died at Beaufort, South Carolina, on September 23, 1944, at the age of 70 years. Sir Robert Jones, himself an eminent British surgeon, said of Hoke, "He was the greatest orthopedic surgeon in the world". Dr. Hoke practiced for many years in Atlanta, Georgia. The formation of the chain of Shriners' Hospitals, which have greatly advanced the reconstruction of thousands of cripples throughout the country, was in no small measure due to him. Hoke was an ex-president of the American Orthopedic Association, and he contributed largely to the medical press. For several years, Dr. Hoke was Chief Surgeon of the Infantile Paralysis Foundation at Warm Springs, Georgia.

Dr. Hoke devised and used a number of valuable improvements in the surgical reconstruction of bone and joint deformities. To his fellow surgeons and to his students, he would insist that, at the time of operation, the surgeon must attain exact relationships to the normal of the parts involved, and not over-correct. Many surgeons are in the habit of over-correcting (as in clubfoot, for instance), on the theory that, in the convalescence period, the parts will warp back to the normal. Hoke pointed out that this was poor surgery — meticulous insurance of exactness of position and of retention in plaster of Paris dressings, during the bone-uniting period of convalescence, was the only scientific procedure possible. Also, in ankle and foot deformities of long standing, Hoke called attention to the fact that the x-ray films often showed an appreciable degree of torsion of the leg bones; and



that normal function could not be attained, in this complication, without osteotomies of one or both leg bones, with untwisting, always with exactness of position. His results warranted his thesis.

Dr. Hoke had a charming personality. I consider my own associations with him among my most prized memories.

WALTER TRUSLOW

Shapley's Useful Yardsticks

DR. HARLOW SHAPLEY, of Harvard, speaking recently before the American Association for the Advancement of Science, pointed out that "during the first eleven days of the Normandy invasion we lost, in killed, an average of 300 Americans a day." But cancer killed about 400 Americans, said Dr. Shapley, on each of those days. "And cancer does not ease up, it offers no armistice, it tortures before permitting death release, and it will eliminate 150,000 more Americans during the next twelve months. It should be noted that we are now spending less than two dollars in the cancer war for every \$1,000,000 in the war against foreign enemies."

This graphic way of measuring the terrific power of an enemy in the shape of disease and of picturing our willingness to pour out our wealth against a military enemy who is actually less of a menace than is cancer seems to us very effective.

A Black Market for Babies

ACCORDING to accredited adoption services, there is a kind of black market in babies for adoption. Faulty and

—Concluded on page 348



CUZZORT

Experiment III

CULTURAL MEDICINE

STEPHEN HALES—FATHER OF HEMODYNAMICS

The discovery of the blood pressure was more important than the discovery of the blood.

—Johannes Müller

WHEN taking blood pressures in our facile fashion with relatively perfected apparatus it would be well at times to cast a grateful and admiring look backward to the experimental physiologist Stephen Hales, for in the Pantheon of medical pioneers he occupies a unique place among the greater gods.

Fulton ranks Hales's observations on the mechanics of the circulation with the studies of Harvey. After the contributions of Cesalpinus, Harvey, Borelli, Lower and Malpighi, Hales made it possible to calculate the work of the heart, to estimate peripheral resistance, and, in time, to determine blood pressure in present-day fashion, although more than a hundred years elapsed before Poiseuille introduced his mercury manometer (1828) and Ludwig his kymograph (1847), advances which still left much to be done before the familiar clinical procedures of today became finally practicable.

Hales the physiologist introduced the experimental method into medicine, to be further developed by Magendie, Poiseuille, Marey, Pavloff, and Loeb; contributed to our knowledge accurate records of the blood pressure, taken directly for the first time, in various animals; gave a clear account of circulatory mechanics including the role of the peripheral vessels; made important observations on the comparative physiology of the heart in different animals; was the discoverer (with Robert Whytt) of spinal reflex action and one of the originators of artificial ventilation; investigated thoroughly and with the greatest ingenuity the movement of sap in plants; collected various gases over water and studied their nature, making possible the later work of Priestley, Black, Laplace, Lagrange and Spallanzani.

From the Editorial Research Department of the Medical Times.

MEDICAL TIMES, NOVEMBER, 1944

LIKE some other famous gentlemen of the cloth—Gilbert White, Dean Swift, Laurence Sterne—whose lights have shone brightly in the world as well as before sacred altars, Hales was a parish priest of the Anglican church. He deliberately avoided preferment in the church, "lest his time and attention might thereby be diverted from his other favorite and useful occupations." One infers from the dull sermon which he delivered at St. Bride's, London, on March 21, 1734 (text *Gal. vi. 2*), that he was not a top-flight preacher.

Hales was born of distinguished ancestry at Bekesbourne in Kent on September 17, 1677. His studies at Cambridge seems to have been centered in the old laboratory of Sir Isaac Newton and mostly in the field of science—biology, comparative anatomy, Newtonian physics and astronomy, chemistry, the laws of mechanics, and mathematics. He entered Cambridge in 1696, became a fellow in 1702, proceeded M.A. in 1703 and B.D. in 1711; created D.D. by Oxford University in 1733. After taking holy orders he was presented with the perpetual curacy of Teddington, Middlesex, where he remained all his life, despite the fact that he enjoyed rectorships at different times in Somerset and Hampshire, for the actual administration of which he paid other members of the clergy, as was then frequently done. At the quiet Teddington rectory, like Mendel in his monastery garden at Brünn, he carried out his long series of experiments in animal and plant physiology which have won the unstinted praise of all commentators. Sachs ranks his originality and importance in plant physiology as high as medical historians place him in animal physiology.

AN early experiment while Hales was still in residence at Cambridge reveals the same type of wizardry that he was later to apply in his work at Teddington. To make a cast of the lungs "he placed a musket barrel over a pan of lighted charcoal, so as to be kept in an equal and pretty considerable degree of

heat. He then took the lungs of a dog, with the windpipe, and having fastened the windpipe very closely to the touchhole of the barrel, he applied a pair of bellows to the muzzle, and thus poured a stream of air, heated by its passage through the barrel, into the lungs; by continuing this for about an hour, so as to keep the lungs always inflated, they were at length perfectly dried in an inflated state, so as not to collapse when taken away from the gun barrel; they were then properly placed as a mould, and melted lead poured into them, the metal not being more heated than just to bring it into fusion; the lungs, thus filled, were put into cold water, and suffered to macerate till their whole substance washed off, leaving a perfect cast in lead of all their fine pipes and cavities, in all their various convolutions, and in their natural situation with respect to each other.

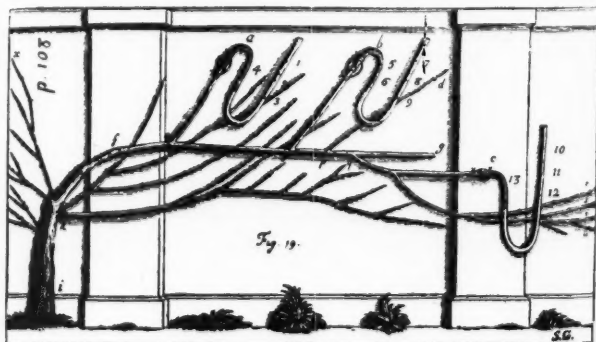
The way in which such early physiologists surmounted lack of modern equipment and materials is something to marvel at. Were they living today, with proper tools available, their native genius might not be so strongly challenged and so greatly stimulated.

HALES published his *Statical Essays* in two volumes. The first volume, recording his experiments in plant physiology and on free and combined gases, was issued in 1727, bearing the imprimatur of Sir Isaac Newton himself as president of the Royal Society, of which Hales was a member. The second volume, *Hæmastaticks*, appeared in 1733. However, it is to be borne in mind that the twenty-five animal experiments described were made before Hales's studies of sap movement and pressure in the plant world. The individual experiments in the book are not dated, but Hales says that his first experiments were on dogs, about 1708 (Cambridge period), and that six years afterward he repeated similar experiments on horses, which fixes the time of the latter about 1714. This serves in part to explain the

puzzle as to why he did not use a mercurial manometer in his animal experiments as he did in his measurements of sap pressure. One must assume either that the use of a mercurial manometer in the latter case was a later thought, or that he did attempt to use a mercurial manometer in his blood pressure work and was baffled by technical difficulties with respect to coagulation, something which was solved one hundred and fourteen years later by Jean Leonard Marie Poiseuille, who established connection with the artery by means of a hollow lead tip filled with the anticoagulant potassium carbonate. We are not willing to concede that such difficulties would have baffled Hales if he had chosen to challenge them, the more so because Hales knew that he could retard coagulation with potassium nitrate. Such is our confidence in his genius. The truth probably is that at the time of his animal experiments he proceeded by the most direct and simple method, developing the use of the mercurial manometer later in the course of his sap experiments. If, after that, he had done further work on blood pressure, it is our belief that he would have adapted the mercurial manometer to it in the manner of Poiseuille. By "the most direct and simple method" we mean the employment of a long glass tube inserted directly into a carotid, jugular or crural vessel.

WHAT impelled Hales to perform his experiments? Aside from his desire to test the prevailing theory that

The force of rising sap was found by Hales in the instance pictured below to be "near five times greater than the force of the blood in the great crural artery of the horse."



muscular action was in some way dependent upon the force of the blood—the error in which he demonstrated, engendering in him a surmise that an electrical factor entered into the contraction of muscle—Hales reasoned as follows: “As the animal body consists not only of a texture of solid parts, but also of a large proportion of fluids, which are continually circulating and flowing, thro’ an inimitable embroidery of blood-vessels, and other inconceivably minute canals: And as the healthy state of the animal principally consists, in the maintaining of a due equilibrium between those solids and fluids; it has, ever since the important discovery of the circulation of the blood, been looked upon as a matter well worth the inquiry into, to find the force and velocity with which these fluids are impelled; as a likely means to give a considerable insight into the animal economy.” And in another place, Hales remarks that “In natural philosophy, we cannot depend on any mere speculations of the mind; we can only with the mathematicians, reason with any tolerable certainty from proper data, such as arise from the united testimony of many good and credible experiments.”

The animals employed by Hales in his experimental work consisted of three horses, a sheep, a doe, and twenty dogs. We have selected Experiment No. III to illustrate his method. Although medical historians usually say that Hales had no assistance in his work, the reader of the following description of Experiment III will note the mention of an assistant. It is for this reason that we have felt justified in introducing another figure among the dramatis personæ of our picture, as a reader of the glass gauge. It is difficult to understand how otherwise Hales could have effected his many tube removals and replacements for bloodletting. Moreover, speed was essential because of the coagulation handicap.

EXPERIMENT III

1. In December, I laid a common field gate on the ground, with some straw upon it, on which a white mare was cast on her right side, and in that posture bound fast to the gate; she was 14 hands and 3 inches high, lean, tho’ not to a great degree, and about 10 or 12 years old. This and the above mentioned horse and mare were to have been killed as being

Statical ESSAYS:

CONTAINING

HÆMASTATICKS;

OR,

An Account of some HYDRAULICK and HYDROSTATICAL Experiments made on the Blood and Blood-Vessels of Animals.

ALSO

An Account of some Experiments on Stones in the Kidneys and Bladder; with an Enquiry into the Nature of those anomalous Concretions.

To which is added,

An APPENDIX,

CONTAINING

OBSERVATIONS and EXPERIMENTS relating to several Subjects in the first Volume. The greatest Part of which were read at several Meetings before the Royal Society.

With an INDEX to both VOLUMES.

VOI. II.

Defilerator Philosophia Naturalis vera & activa cui Medicina Scientia indifferitur.

FRAN. DE VERUL. INFLAUR. MAGNA.

By STEPHEN HALES, B.D.F.R.S.
Rector of Farringdon, Hamfshre, and
Minister of Teddington, Middlesex.

LONDON:

Printed for W. INNY and R. MANBY, at the West-End of St. Paul's;

And T. WOODWARD, at the Half-Moon between the Temple-Gate, Fleet-Street. MDCCXXXIII.

Title-page of Hales's Statical Essays, Vol. 2, 1733.

unfit for service.

2. Then laying open the left jugular vein, I fixed to that part of it which comes from the head, a glass tube, which was 4 feet and 2 inches long.

3. The blood rose in it, in 3 or 4 seconds of time about a foot, and then was stationary for 2 or 3 seconds, then in 3 or 4 seconds more, it rose sometimes gradually and sometimes with an unequally accelerated motion, 9 inches or more, on small strainings of the mare: then upon greater strainings, it rose about a yard, and would subside 5 or 6 inches: then upon a larger strain or struggle of the mare, it rose so high, as to flow a little out at the top of the tube: so that had the tube been a few inches higher, it would have risen probably to that height.

4. When the mare ceased to strain or struggle, the blood subsided about 18 or 20 inches; so the return of the blood into the vein was not hindered by the valves, which I have also observed in other parts

where there are valves; tho' sometimes they absolutely hinder the return of any fluid.

5. The diameter of the brass pipe and tube which were fixed to the vein, were nearly $\frac{1}{7}$ of an inch : the diameter of the jugular vein about half an inch.

6. Then laying bare the left carotid artery, I fixed to it towards the heart the brass pipe, and to that the wind-pipe of a goose; to the other end of which a glass tube was fixed, which was 12 feet 9 inches long. The design of using the wind-pipe was by its pliancy to prevent the inconveniences that might happen when the mare struggled, if the tube had been immediately fixed to the artery, without the intervention of this pliant pipe.

7. There had been lost before the tube was fixed to the artery, about 70 cubick inches of blood. The blood rose in the tube in the same manner, as in the case of the two former horses, til it reached 9 feet 6 inches height. I then took away the tube from the artery, and let out by measure 60 cubick inches of blood; and then immediately replaced the tube to see how high the blood would rise in it after each evacuation; this was repeated several times till the mare expired, as follows, viz.:

The Several Trials	Cubic Inches let out	Perpendicular Height after each Evacuation	
		Feet	Inches
1	70	9	6
2	130	7	10
3	190	7	6
4	240	7	3
5	310	6	5
6	370	4	9
7	430	3	9
8	490	3	4
9	550	2	9
10	610	3	2
11	670	4	5
12	730	2	9
13	790	3	5
14	820	2	0
15	833	2	5

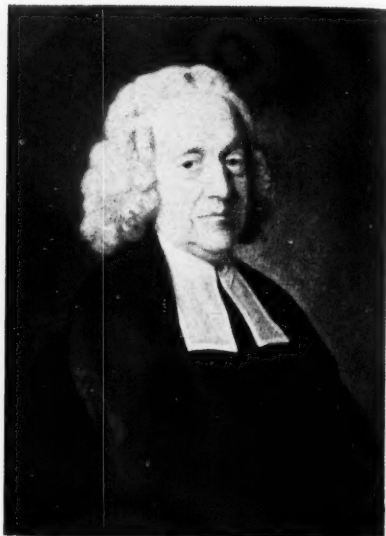
**Deep Sighing raised the Blood. When the Force of the Blood was thus small, then faint Sweats came on.*

*Very faint.
Now expired.*

8. We may observe that these three horses all expired, when the perpendicular height of the blood in the tube was about two feet.

9. These 833 cubick inches of blood weigh 31.82 pounds, and are equal to 14.4

wine quarts, the large veins in the body of the mare were full of blood, there was some also in the descending aorta, and in both ventricles and auricles.



Stephen Hales
1677-1761

10. In order to make an estimate with what force the heart of this mare must propel the blood, to raise it in the tube to the height of nine feet six inches, I injected the right ventricle of the heart in the following manner, viz.:

11. I fixed a musket-barrel to the pulmonary vein, near its entrance into the left auricle, and tied the ascending and descending aortas fast, at some distance from their branching off from each other : then placing the barrel in a perpendicular posture, with a funnel on the top of it, I poured in melted beeswax, till the funnel was half filled. Yet, as I had found by experience, this perpendicular height of melted wax, which was near four feet, would not have filled the auricle and ventricle, if I had not at the same time taken care to pass a small brass pipe thro' one of the ascending branches of the aorta, into the left ventricle; thro' which the air passed off as the wax entered into the ventricle, the brass pipe being at the same time gradually drawn up by an assistant, who, as soon as all the air was driven

out, tied that branch of the aorta, to prevent the flowing out of the wax.

12. I chose this method of injecting from a perpendicular height rather than by a syringe, both because I was by this means assured of the force with which the injected cavity of the heart was dilated, which is more uncertain with a syringe; and also because this dilating force from the perpendicular height, continued acting uniformly till the wax was grown stiff and hard.

13. When cutting open the left ventricle, I found the thickness of its muscular coat to be $1 + \frac{1}{2}$ inch, and the thinnest part of that of the right ventricle was half an inch.

14. Then taking out the wax which was formed in the shape of the ventricle, I cut the wax of the left ventricle off, where the valves, called mitrales, made the separation; which valves were propelled inward by the entering wax; and I did the same also at the orifice of the aorta, where the valves called semilunares were also propelled inward by the above-mentioned brass vent-pipe.

15. And this is the proper cavity of the left ventricle, just before its contraction; for at that instant, the blood flowing in from the auricle has opened the mitral valves inward while at the same time the contracting arteries repel the blood forcibly against the semilunar valves; but at the instant that the ventricle contracts, the mitral valves are closed, being expelled by the blood outwards, while at the same time the semilunar are by the same action opened outwards, to make way for the compressed blood to rush into the aorta.

16. So that this piece of wax thus formed, may reasonably be taken to be nearly commensurate to the quantity of blood received into this ventricle at each diastole, and is thence propelled into the aorta at the subsequent systoles.

17. Having therefore filled a narrow-mouthed vessel brim-full of water, I immersed the wax in it; then taking it out of the water, I filled the vessel brim-full again, from another vessel, whose capacity was divided into cubick inches, which gave the bulk of the wax, and consequently the capacity of the left ventricle, equal to ten cubick inches.

18. I got the quantity of the surface of the sides of this ventricle by laying pieces of paper aptly cut to the irregular form of the several parts of the wax,

and then laying those papers under another paper, which was equally divided into little squares of one-fourth inch each; by running a pin thro' both papers at every corner of each square, the under papers being thus marked too, it was easy by numbering their several squares and parts of a square, to come pretty nearly to an estimate of the whole inward surface of the ventricle; which I by this means found to be equal to 26 square inches, deducting one square inch for the area of the orifice of the aorta, whose diameter I measured from the injected wax.

19. The diameter of the aorta just before the coronary artery branches from it, was 1.15 inch, whence its area 1.036 square inch.

The diameter of the descending aorta 0.93, its area 0.677.

The diameter of the ascending aorta 0.74, its area 0.369.

20. The inward area of the sides of the left ventricle being therefore equal to 26 square inches; the sum of the whole pressure of the blood against all the sides of that ventricle, at the instant when it begins first to contract, so as to sustain the pressure of the arterial blood, will be that surface or area multiplied into the perpendicular height of the blood in the glass tube, viz., 26×114 inches, viz., 2964 cubick inches of blood.

21. And since, according to Dr. Jurin's estimate, in Motte's Abridgment of the Transactions, part 2d, page 141, a cubick inch of blood weighs 267.7 grains, these multiplied into 2964, the number of cubick inches, and then reduced into pounds, give 113.22 pounds, which is the sum of the pressure of the blood, which this ventricle sustains, at the instant when it is going to exert a contractive force, sufficient to propel it with considerable velocity into the aorta.

22. The scruple avoirdupoise contains 18.25 grains, the ounce 438 grains, the pound 7008 grains.

23. The area of the greatest section of this ventricle from apex to base being 6.83 square inches, these multiplied into 114 inches, the perpendicular height of the blood, in the tube, give 778.62 cubick inches of blood, equal to 29.7 pounds, the force of the blood which the muscular fibres in that transverse section of the ventricle must resist.

24. The velocity with which the blood is thrown out of the ventricle into the orifice of the aorta, may be thus computed; viz.,

the capacity of this ventricle being equal to ten cubick inches, and the area of the transverse section of the aorta being 1.036, by which dividing the ten cubick inches, the quotient 9.65 is the length of the cylinder of blood, which is formed in passing thro' the aorta's orifice, at each systole, of the ventricle. And a horse's ventricle of his heart contracting, or his pulse beating 36 times in a minute, that is, 2160 times in an hour, then a column of blood so many times 9.65 inches, or 20,844 inches long, or 1737 feet will pass in an hour.

25. But the systoles of the ventricle during which that quantity of blood is propelled, being estimated to be done in one-third of the space of time between each pulse, the velocity of the blood during each systole, will be thrice as much, *viz.*, at the rate of 5211 feet, *i.e.*, 0.98 of a mile in an hour, or 86.85 feet in a minute.

TIGERSTEDT (1906) cites Lortet's work on the velocity of the blood in the horse. Lortet found it to be, in the carotid, 520 mm. per second in systole.

HALES estimated the blood pressure in man to be about $7\frac{1}{2}$ feet according to his system of measurement. "A remarkable approximation," says Willius and Keys. "Somewhat high, of course."

IN reporting Experiment VII, Hales meets possible criticism of his method in the following manner, showing that he appreciated the difference between lateral and end pressures and incidentally describing one of his ingenious devices:

"It may be objected to this method of estimating the force of the blood, that by thus fixing tubes to these large veins and arteries, the course of a considerable stream of blood was for that time stopped; and that consequently the force of the blood must be proportionately increased in all the veins and arteries: and doubtless to some degree it is so. To obviate therefore this inconvenience, I fixed tubes laterally to the jugular veins and arteries of the dog, Numb. 13, in the following manner: *viz.*, I took two cylindrical sticks which were $\frac{1}{2}$ inch diameter, and $1 + \frac{1}{2}$ inch in length; and having bored holes through them from end to end, something larger than those of veins and arteries; I then slit them in halves length-ways, and bored another hole through the middle of

one of them into its cavity, into which lateral hole the brass pipe entered; which was, at its other end, adapted to fit another pipe which was cemented to a glass tube. Then having laid the vein or artery bare, I drew a linen cloth under it, to wipe it very dry; and then placed under it one of the above-mentioned slit pieces of wood, laying the vein or artery in its cavity, which was covered with pitch, that was at that instant afresh melted with a small warm iron rod; then pouring melted pitch not very hot, over the vein or artery, I immediately put on the other half of the split wood, which had the hole bored thro' it, and tied them fast together: then entering the slender point of a pen-knife into the above-mentioned hole, I cut an orifice in the vein or artery, and then immediately fixed the brass pipe and tube to receive the following blood, which rose from the jugular vein of the thirteenth dog, first, six inches, and on straining $9 + \frac{1}{2}$ inches, and from the artery four feet eleven inches."

IN Experiment I Hales mentions "untying the ligature on the artery" so as to permit the blood to rise in the glass tube. This ligaturing was evidently part of his general technic.

Leaving nothing unstudied, Hales devised ingenious ways of accurately measuring the force required to burst arteries and veins, all of which are described in *Hæmastatics*.

"THE determination of blood pressure made it possible to calculate the work done by the heart, and to estimate for the first time the magnitude of the peripheral resistance" (Fulton).

Hales understood the relation of the velocity of the blood to the area of the stream bed. "The arteries continually sending off innumerable branches, the sum of whose orifices is continually larger than the main stems, hence the velocity of the blood must be proportionately rebated." In another place he says: "Now this velocity is only the velocity of the blood at its first entering into the aorta, in the time of the systole; in consequence of which the blood in the arteries, being forcibly propelled, with an accelerated impetus, thereby dilates the canal of the arteries, which begin to contract at the instant the systole ceases; by which curious artifice of nature the blood is carried

on to the finer capillaries, with an almost even tenor of velocity, in the same manner as the spouting water of some fire engines is contrived to flow with a more even velocity, notwithstanding the alternate systoles and diastoles of the rising and falling embolus or force. . . . For though the velocity of the blood at its first entrance into the aorta, depends on the proportion the area of its orifice bears to the quantity thrown into it at each systole, and also on the number of these systoles in a given time; yet the real force of the blood in the arteries, depends upon the proportion which the quantity of the blood thrown out of the left ventricle in a given time, bears to the quantity which can pass thro' the capillary arteries, into the veins in that time."

With respect to hydrostatic pressure, Hales allowed for it as follows: "When the animal stands on its legs, a column equal to the perpendicular height of the animal, must be added to the several heights of the blood in the glass tubes, in order to estimate the force with which the blood presses against the coats of the blood vessels, at the lower parts of the body, and so in proportion for any other part that is higher."

Clark-Kennedy has summarized some representative experiments of Hales in the following form:

	Ox	Horse No. 3	Sheep	Dog No. 1	Dog No. 4
Weight of animal in pounds	1600	825	91	52	12.5
Pulse rate: beats per minute	38	36	65	97	148
Pressure of blood in jugular vein in inches of blood	..	12-52	5-9	6	4
Pressure of blood in carotid artery in inches of blood	..	114	77	80	39
Internal surface area of left ventricle at commencement of systole in square inches	..	26	12.35	11	1.2
Weight of blood sustained by whole surface of contracting left ventricle in pounds	..	113	36.6	33.6	11.1
Ventricular output per beat in cubic inches	12.5	10	1.85	1.17	0.5
Ventricular output per minute in cubic inches	475	360	120	114	74
Systolic velocity of the blood at the aortic orifice in feet per minute	77	87	175	145	210
Time taken by the heart to expel a weight of blood equal to that of the animal's body in minutes	88	60	20	12	7

HALES initiated the long series of contributions in this field by Poiseuille, Ludwig, Faivre, Otfried Müller and Blanel, Dehon, Debus and Heitz, Vierordt, Marey, von Basch, Potain, Riva-Rocci (cuff, bag and bulb—1896), and Hill and Barnard (pressure gauge instead of a mercury manometer—1897).

TO this unique and versatile genius who set a perfect example of the scientific method in physiology, botany, chemistry, medicine and sanitary engineering Britain has erected a monument in Westminster Abbey; but the whole world of pure science adds its homage.

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THE TOXICITY OF COMBUSTION GASES WITH SPECIAL REFERENCE TO TOBACCO SMOKE AS A CARCINOGENIC FACTOR

Edwin J. Grace, M.D., F.A.C.S.

Brooklyn, N. Y.

Introduction and acknowledgments

ASURVEY of the literature dealing with the toxicity of tobacco smoke reveals an amazing divergence of opinion concerning the possible injurious effect of smoking on the respiratory tract and other organs of the human body. Beside the two diametrically opposed views on this subject, there are a great many intermediary opinions whose supporters are reluctant to join openly either one or the other camp.

At a time when the entire nation is concerned about the welfare of our men, both in the army and in the navy, it is most opportune to analyze impartially the picture as it presents itself to a medical man who has had an unusual opportunity to study the various causes of respiratory ailments, including those due to the use of tobacco.

IN three previous medical papers, published elsewhere (1942, 1943), I attempted to coordinate, from authentic data, the possible relationship between the deposition of tar in the bronchial passages after cigarette smoking, and cancer of the lung. For some time clinicians have been aware of the possible relationship between tobacco smoking and cancer of the lip, tongue and bronchial passages; however, great difficulties were encountered in the attempt to verify this supposition because of the lack of sufficient proof. The reason for these difficulties is, first, that the smoking habit is extremely prevalent everywhere, and, second, that reliable experimental proof, though plentiful for many other diseases, is not as reliable or not available in cases of cancer.

During my unusual opportunities over a period of years I have noted that cancer of the lip and tongue was almost invariably associated with a smoking habit dating back many years. In many instances the first person approached by the patient for professional advice was a

From the Grace Clinic.

dentist. I feel very confident that a great percentage of the patients afflicted with cancer of the oral cavity could be saved from mutilating surgery, and subsequent misery, if the dentist, who has a great opportunity to use preventive medicine, would more often actually recognize the responsibility he is facing, and fully utilize this opportunity.

THE seriousness of cell damage in the oral cavity which may follow simple leukoplakia may ultimately result in a high grade undifferentiated cancer from constant irritation from tobacco tar and its carcinogenic compound, benzopyrene.

A grave professional responsibility and challenge rests upon the entire dental profession, because dentists, as a rule, see the patient at a time when the greatest chance for preventive measures exists. Therefore I cannot recommend and emphasize too strongly a more fundamental philosophy of cooperation of the dental profession, for I know of no field of cancer therapy which offers a better chance for preventive and curative measures.

Surgeons and surgeon dentists frequently approach the cancer problem when tissue damage has already taken place, and follow merely a technical routine in trying to rectify the damage and thereby resort to extensive and mutilating interference, though frequently only a limited amount of biopathological evidence may be available to justify it. The insidiousness of tissue damage as demonstrated by experimental data on animals shows that, in humans, irritation from tar carcinogen (benzopyrene) is necessary plus susceptibility in the individual, before cells undergo a change to a malignant type of growth.

CASTIGLIONE has said: "We know, however, that in spite of all prohibitions and attacks, the use of tobacco has increased constantly throughout the whole world until today it has reached almost unbelievable proportions; at the same time opposition to its immoderate use begins to take definite shape on the basis of scientific experimental research and clinical observations."

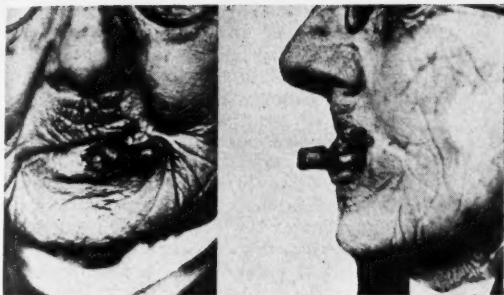


Fig. 1.

Squamous epithelioma of the lower lip. Patient of 74 yrs. A heavy cigar smoker. The cancer developed exactly on the spot where she used to hold her cigar.

(Photo by Roffo)

In this contribution I will present some "scientific experimental research" and some "clinical observations." It is a matter of great regret that the medical profession does not fully comprehend the magnitude of A. H. Roffo's contribution, and due either to indifference or ignorance, blissfully fails to apply his proven biologic principle to the clinical practice of medicine. Although lacking the dramatic aspects of curative medicine, preventive medicine is still one of the great bulwarks that perpetually stand to protect human welfare. It is with this fundamental philosophy of medicine in mind that I present this monograph.

I cannot express too eloquently my gratitude to Professor A. H. Roffo for his help in this work but the innumerable references that have been made to his work testify what we, in medicine, owe him for his monumental contribution.

Also this work could not have been presented without the aid of Mrs. Hilda H. Wheeler, especially in the translation of the Spanish reprints that I have heavily depended upon.

Carcinogenic Properties of benzopyrene

IN past investigations, nicotine has been considered the chief factor in the problem of tobacco smoking. The majority of scientific authors stress that nicotine is the primary injurious constituent, since it is present in large enough quantities to be potentially harmful.



Fig. 2.

Epithelioma of the lower lip. Heavy cigarette smoker.

(Photo by Roffo)

In recent years however, one of the most active investigators of the injurious effect of tobacco smoking and other combustion gases, A. H. Roffo of Buenos Aires, has discovered that tar, particularly tobacco tar, has a decidedly unfavorable effect upon the human organism.

Roffo (1941) emphasizes that tobacco tar causes more active and consequently more malignant neoplastic growths than does coal tar. However, it has been proven repeatedly that the presence of a biological predisposition of the tissues for cancerization is necessary in conjunction

Fig. 3.

Epithelioma of the lower lip. Extremely heavy cigarette smoker.

(Photo by Roffo)

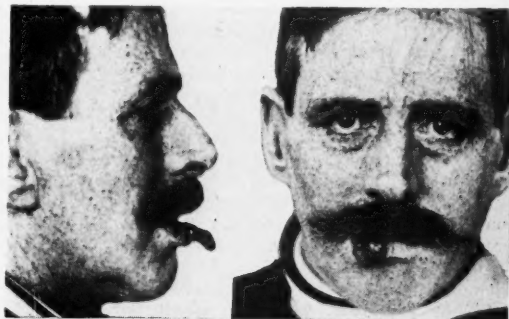




Fig. 4.
Cancer of the lower lip. This woman has been a heavy smoker all her life. (Photo by Roffo)

with a carcinogenic agent. Roffo also states that clinical observations have revealed the fact that about 95% of the lung, laryngeal and pharyngeal carcinomata occur in smokers. Even the fewer cases among women admitted to the University Institute for Experimental Medicine and the Study and Treatment of Cancer in Buenos Aires, who suffered from Cancer of a similar nature, were heavy smokers. Mortality among smoking cancer patients mounted from 148 in 1926 to 513 in 1937. Tars from nine different kinds of tobacco which are on the market possess definite carcinogenic action. While all tobaccos have carcinogenic properties, intensity of cancerization depends upon the type of plant used. Carcinogenic action is most strongly developed in the Turkish, Egyptian, Kentuckian and chewing tobaccos. The other kinds of tobacco take second place, although even they caused carcinomata in 50% of the experiments. Studies carried on for a long period up to the year 1938 prove that the smoking of tobacco causes cancer in the presence of favorable biological conditions. In order to realize the danger to which a smoker is exposed, we need only figure out that a smoker who uses about two

pounds of tobacco a month (representing an average of about 70 cc. of tar), deposits upon the mucous membranes of his mouth, larynx, pharynx and lung, approximately, 840 cc. of carcinogenic tobacco tar in one year, or eight liters of this toxic substance in ten years.

Previous studies of this author indicate that the carcinogenic agent is not contained in the nicotine, but that it is a component of the products of combustion of tobacco, distilled at temperatures of 350°C. and higher.

IN 1939 Roffo and Luchetta (1940) isolated the actual carcinogenic component (benzopyrene) of tobacco tar by fractionated distillation at a temperature of more than 380°C. Experiments with this tar revealed that it is

highly carcinogenic;; it causes penetrating, expanding and destructive proliferations. The primary lesions appear earlier than those caused by the use of total tobacco tar. On the basis of these observations Roffo concludes that tobacco-benzopyrene is responsible for the carcinogenic action found in tobacco tar. Experimental animals died in one or two years after developing true cancer. According to Roffo, painting with tobacco tar obtained from pyrogenetic distillation of dry tobacco leaves produced true cancer in rabbits. All hematic elements underwent more or less pronounced changes, particularly the erythrocytes which presented modifications in three distinct stages: 1. A moderate irritation of the bone marrow and simultaneous release of a large number of immature red blood corpuscles into the circulatory system. 2. Increased irritation of the bone marrow and appearance of papillomata, i.e., a still greater number of immature red blood corpuscles in the peripheral circulatory system. 3. Decrease and disappearance of the erythrocytes coinciding with the

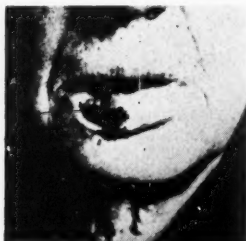


Fig. 5.
Cancer of the lower lip. This woman, 65 years of age, was inveterate cigar smoker. (Photo by Roffo)

cancerous proliferations of the papillomata and with cachexia. The blood picture showed two distinct stages, the first corresponding with the pre-cancerous stage, characterized by anemia of the plastic and regenerative type, by neutrophilia and monocytosis; the cancerous phase manifests itself by anemia of the aplastic or degenerative type and decrease of the number of neutrophiles and monocytes.

By extracting tobacco tar with organic solvents such as alcohol, chloroform, acetone, petroleum ether, paraffin and benzol, Roffo (1942) found that it is possible to eliminate substances which generate carcinogenic hydrocarbons found especially among the phytosterols. Phytosterol represents approximately 0.53% of the dry substance in black tobacco, and 0.78% in the golden variety, a proportionately large quantity when compared with extracts prepared from food plants, for instance the potato with 0.15%, several varieties of cabbage with 0.12%, oats with 0.20% and squash with 0.16%. Experiments with tar extracted in the manner described showed that it was only mildly carcinogenic, compared with experiments in which whole tar was used. The tumors of the experimental animals were, anatomically and histologically, keratotic papillomata which failed to develop into cancer. The experimental animals lived longer, sometimes more than 2 or 3 years. It is suggested that tobacco whose tar has been rendered less carcinogenic, as in the experiment cited, would provide a safer and less irritating smoke.

IN another paper Roffo (1942) reports that tumors produced by tobacco tar in 1000 experimental animals (rabbits) were of the histologic type of fusocellular sarcomas. This proves that tobacco tar has a carcinogenic effect upon the basic tissues of the organism, namely, on the epithelial tissues by inducing carcinomata, and on the connective tissues by producing sarcomas. Fluorescence of tobacco tar is very pronounced, showing navy blue coloration with a tendency to purple. Similar results were obtained after rats had been exposed to sunlight or ultraviolet rays. A malignant carcinoma developed on one ear of the animals, while a fusocellular sarcoma appeared simultaneously on one eye. Both types of tumor reached an enormous size and their malignancy was manifested by numerous metastases in the

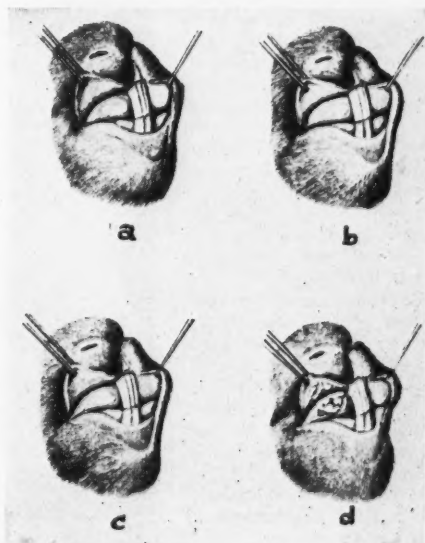
lymphatic glands.

Following up their toxicity studies of tobacco smoke, A. H. Roffo and A. E. Roffo, Jr. have analyzed the influence of various other combustion gases upon the human organism. These studies were carried out with the specific purpose of determining the relationship between cancer and exposure to combustion gases.

INTENSIFIED motorized traffic and the adoption of fuel oil for the heating of homes and in industries cause pollution of city air with toxic products of combustion like carbon monoxide, hydrogen carbide, etc., all highly irritating to the respiratory tract. Investigations have disclosed that a mineral acid containing hydrogen carbide, present in city air, is identical with that which escapes from the exhaust pipes of automobiles. A series of rats (Roffo, 1939) were exposed to the effect of combustion gases from fuel oil and developed malignant pulmonary tu-

Fig. 6.

Gradual development of a leukoplasic lesion in a rabbit's mouth, treated by tobacco smoke. To the dentist and the physician, the significance of this chronic irritation is quite obvious. After 10 months, the tissue defense (leukoplakia) finally is broken down, and a malignant process starts, as noted in d. (Photo by Roffo)



mors with histologic characteristics of paramalpighian cancer associated with general metastasis in the ganglia of the neck, axillae, groin, mediastinum, liver, diaphragm and mesentery. A rat of the same series developed a different pulmonary tumor in 15 months and 18 days, with pneumoconiosis and lymphatic anthracosis; the right pulmonary lobe was hardened and showed nodular infiltrations of varying size. The neoplastic, keratotic process invaded the entire alveolar cavity. The stomach of this rat also showed lesions characterized by marked epithelial hyperplasia. In the glandular mucosa there were three deeply seated ulcers with protruding borders, situated in the region between the pylorus and the epithelial dividing borders. Histological examination of the circular ulcerations revealed a necrotic destruction of the glandular nucleus. In both cases hydrogen carbide was responsible for the development of cancer: in the lung through respiration of combustion gases, and in the stomach through absorption of food exposed to toxic action.

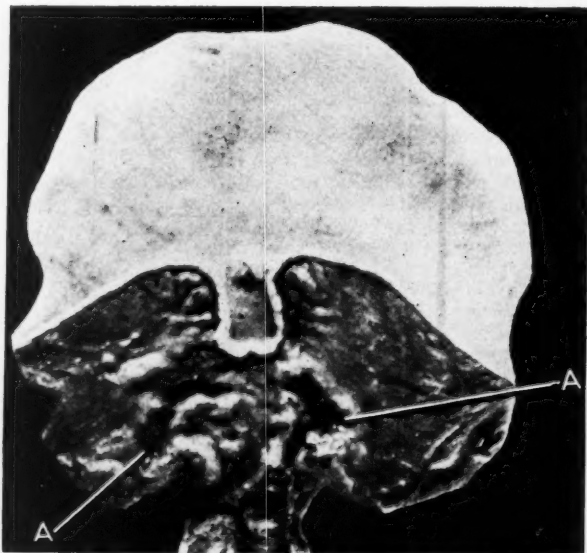
In another report made by Roffo (1941) the author says that white rats were fed fuel-oil distillates in non-toxic quantities, and lived for more than one year without apparent general disturbances. The rats being fed fuel-oil distillates were separated into 3 groups, according to the fuel oil fraction distilled between 240-270° 270-300°, and 300-330°. Fifty per cent of the rats used in these experiments developed stomach lesions with anatomic, pathological and histological manifestations of multiple *ulcus rodens*. This finally degenerated into a typical adenocarcinoma of the stomach. The physiochemical properties of these distillates, their absorption of ultra-violet observed spectrographically, and their intense blue fluorescent point to their carcinogenic properties which are common in all aromatic hydrocarbons with similar characteristics. Another fact observed in

the rats with cancer lesions is the presence of hyperplasia of the spleen. These investigations throw more light on the growing cancer incidence among the urban population. The increasing use of fuel-oil with its noxious consequences should be considered an important factor in the study of cancer prevention.

A. E. Roffo, Jr. (1941) has examined the blood of patients with carcinomata. The spectrographic analysis revealed that the carbon monoxide content was particularly high in persons exposed to the action of two sources: tobacco combustion and city air. Exposure to only one of these sources resulted in a lower CO content. Although the CO quantities thus determined were far below the toxic dose, the slow and chronic asphyxia created by it is of significant importance since it may well prepare the ground for

Fig. 7.

Adenocarcinoma of the stomach of the rat. A shows two ulcerations with infiltrating and vegetating edges. This is one of the most interesting experiments showing the evolution of the neoplastic formation which has also destroyed the outer muscular layer. (Photo by Roffo)



carcinogenesis and also enhance the growth of already existing carcinomata.

A. H. Roffo has also observed gastric cancerization in rats after ingestion of tobacco tar. (See adenocarcinoma of the stomach, Fig. 7.) The dosis of tar given, per day and per animal, was minimal and non-toxic, which was proven by the longevity of the animals, some of them reaching more than two years of age. The gastric lesions developed in about 50% of the experimental animals. It is interesting to stress that it was essentially the glandular zone of the rat's stomach which suffered most from the action of this tar, although some hyperplastic, papillomatous lesions were also found in the squamous zone, and even in the epithelial border. Cancerization of these gastric lesions does not take place until late, the first signs of the malignant process appearing sometimes one year after the ingestion of tar. This observation establishes the relation between the agent and the histologic process in the presence of the cellular stimulant, and resembles human pathology inasmuch as a smoker, during smoking, ingests a certain amount of tobacco tar which condenses after cooling and settles in the mouth, to become mixed with the food and carried to the stomach.

Cancer of the stomach is infinitely more frequent in men than in women, and I have always felt that, as in cancer of the lung, there might exist, in some cases, a relationship between tobacco smoking and cancer of the stomach. Therefore, the experimental evidences of Roffo should be reviewed and evaluated.

SPEAKING of the relationship between smoking and cancer of the lung, Alton Ochsner (1942), of the School of Medicine at Tulane University, says: "I am thoroughly convinced that there is a definite relationship between the two, but, of course, it is very difficult to prove." Referring to his paper presented in conjunction with Dr. DeBakey before the International Cancer Society, he continues to say: "There is a distinct parallelism between the increasing incidence of carcinoma of the lung and the sale of cigarettes."

TO fully appreciate the significance of the photographic studies presented in this paper it is necessary to review cer-

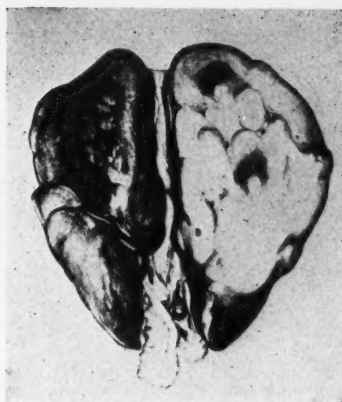


Fig. 8.

Lung of the rat; after injections of tobacco tar, carcinomatous tumors developed in the left lung. (Photo by Roffo)

tain fundamentals of the cancer problem, especially its biologic origin. Cancer is the uncontrolled growth of cells and the cause of this condition is known in many cases; a great contribution to the solution of this problem was advanced when it was possible for the chemist to prepare synthetic compounds (carcinogenic substances) and experimentally produce cancer in animals. This finding immediately brought some order into the chaotic state existing in reference to the myriads of so-called causes made responsible for this malignant disease. With these known biological and chemical elements, cancer has been produced and intelligent understanding of the studies made by Roffo should lead to applications in the field of human cancer. I realize fully the possible criticism which may be voiced regarding the great discrepancy between human and animal data; however, no impartial investigator can review the histories of cancer of the lip, tongue, tonsils, throat and lung without immediately recognizing the deadly parallels between these experimentally produced cancers in animals and those in human cases. In many cases a human cancer, placed next to an experimental cancer, cannot be differentiated, microscopically, one from the other. The value of this information is of tremendous importance for those interested in the control and prevention of cancer.

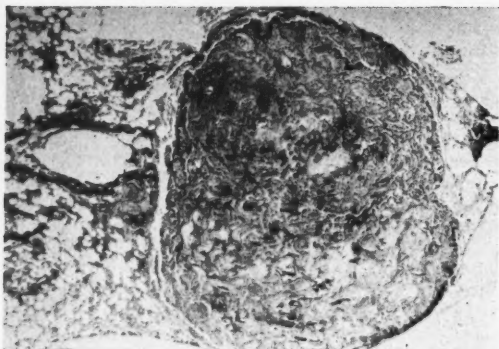


Fig. 9.

Microphotograph: histologic preparation of a pulmonary nodule, showing the structure of the Malpighian horny carcinoma. (Photo by Roffo)



Fig. 10.

Microphotograph: Zone from tumor shown on microphotograph Fig. 9, showing marked atypia and abundant horny formation. (Photo by Roffo)

The Problem of Prevention

USING the numerous investigations reported in the preceding pages as a springboard from which to make further conjectures on the relationship between tobacco poisoning and certain clinical entities which are generally associated with a heavy smoking habit, we may differentiate two such groups: 1. cancer of the lip and oral cavity, and 2. cancer of the lung. The former is most frequently

Figures no. 8, 9 and 10 give evidence of a cancerization in multiple foci developed under the action of tobacco tar, injected directly into the lung parenchyma. This process is characterized by the production of 4 little tumors in the left lung lobe (the site of the injection), all of which present the structure of squamous carcinomata with horny globules. Although the objection might be made that the repeated injection of a drop of tobacco tar does not correspond with the process going on in ordinary human life, and that such a brutal action is bound to produce a trauma, the carcinogenic action of this product is again made evident, whether it be injected into the lung or other tissues. Although this experiment perhaps does not mimic with exactitude the process that the average smoker sets going when he inhales deep into the lung the tar of tobacco, there is enough evidence to suggest the close relationship between cancer of the lung and the effect of this carcinogenic substance generated by smoking tobacco. If preventive medicine is to be considered, this warning should be heeded as most urgent and of the greatest significance.

encountered in pipe and cigar smokers who rarely inhale, but in whom the irritating substance of tobacco is deposited on the lips and tongue. In cancer of the lung, often occurring in cigarette smokers, this toxic irritant is deposited in the bronchi during the process of inhaling smoke. There appears to be no doubt whatsoever that, in the heavy smoker, tar, with its chemical by-products, enters the etiological picture in the development of neoplasms. Toxicologists have already given much of their time to clarification of the

question of the possible relationship between carcinogenesis and tar, and a large amount of material has been written on the subject. However, the preventive phase of the problem has hardly been touched, in fact, it has been persistently ignored.

The experimental studies of Roffo deserve particular attention and further comment, because I feel that the isolation of benzopyrene, the toxic and carcinogenic irritant in tar, may have a far-reaching influence upon diagnosis, prevention, and cure of cancer of the oral cavity and respiratory tract.

IT appears inconceivable that any habit such as smoking could persist for hundreds of years without some very fundamental basis for its continued existence and expansion. To my mind, this phenomenon involves more facts than those that meet the eye, and the real answer to the question is rather psychological in nature.

I know of no other substance in the entire realm of medicine which can so readi-

ly and promptly occupy all five senses and produce a true smoke screen against reality. In addition, this external buffer between environment and mind produces, during the process of inhaling, various chemical substances which have the power to stimulate the nerve centers.

With the incredible speed with which our civilization changes almost from hour to hour, it is not surprising that, in new environments, the minds of some men require tobacco smoking to help them co-ordinate and gradually absorb new facts, and new situations arising from them. Man's entire life and behavior is nothing but the end result of environmental influences on his mind and the countless stimuli received by his five senses from the time of conception to death. The acts and decisions that follow these stimuli are all delivered through the same five senses; it is obvious, therefore, that psychological behavior and physical phenomena are most intimately related, and any habit which has the power to produce a temporary exhilaration will probably persist until both men and women are more adequately prepared mentally to cope with this complex civilization, and a more stable one is created.

The problem is, as I see it, infinitely more profound than is apparent on the surface, and the serious student must review the environment. In spite of the well known detrimental effects of the smoking habit, the temporary solace derived from it obscures the tragic end results which come on insidiously and over a period of many years.

I do not believe that there will be any considerable change in the smoking habit of the peoples of the world until man is able to use his leisure intelligently by trying to equip himself mentally to meet reality. At present, smoking is a mental diversion which is easily accessible and gives prompt results.

HAVING had an opportunity greater than is generally offered the average clinician, I have observed, over a period of more than ten years, an unusually large series of patients with cancer of the lung in two of the large municipal hospitals in New York City. Two distinct factors were noted in these cancer cases which are of great importance in the study of

cancer etiology, namely, 1. the victims were almost always men; 2. they were heavy cigarette smokers and inhalers. There is no experimental proof at hand to demonstrate that the smoking of cigarettes in large numbers was the cause of lung cancer; however, some aspects of this problem should be carefully evaluated by the medical profession. It seems obvious that this product of combustion, benzopyrene, deeply inhaled into the lungs of cigarette smokers—for cigarette smokers usually inhale—is deposited in the lung, probably in the periphery of the small bronchial tubes. Thus, most of the biologic prerequisites for the development or production of cancer are created, and constitute an ideal biological soil for subsequent malignant proliferations.

At the time of diagnosis, primary cancer of the lung is usually associated with

Fig. 11.

Correlation between the carcinogenic action of tobacco tar and of coal tar. The right ear shows seven (7) papillomata developed by coal tar. The left ear shows nine (9) tumors and numerous papillomata developed by tobacco tar. (Photo by Roffo)





Fig. 12.

Enormous tumor, the size of a mandarin, invading the exterior side of the ear, induced by painting with tobacco benzopyrene, extracted from tobacco tar, the active carcinogenic principle of tobacco. (Photo by Roffo)

metastases, and the sites of involvement are sometimes far removed from the actual focus. In fact, any part of the human organism may become invaded. One contributing factor is the extended reticulum of bloodvessels which is centered in the pulmonary area, and which permits a ready dissemination once the vascular system becomes involved. There are various types of carcinomatous involvement which are inoperable. In view of the hopelessness of such cases, it appears doubly imperative to consider carefully the etiological factors of cancer of the lung, and to present an unadulterated picture of the dangers associated with smoking.

The three following cases were studied at the Grace Clinic. All three patients had been heavy smokers and all had inhaled over a period of at least fifteen years. Every one of

them had a very active and inoperable cancer, with metastases, and died as a result of this disease.

Case Reports

Case I. W.D. a male, aged forty years, came to the Clinic March 24, 1937, with a history of numerous head colds, combined with sore throat, and cough. There was a small amount of thick, blood-streaked sputum.

This patient had been gassed during World War I, and at that time had been ill for four months. His father had died of a brain tumor.

The patient had been losing weight. There was no fever or night sweats and no chest pain. Sinus trouble had been present for some time. Roentgenograms taken shortly before this time revealed a possible tuberculosis lesion at both apices, which was of minimal extent, of fibrotic appearance, and apparently arrested. However, a mass-like infiltration was noted extending from the upper part of the left cardiac border into the first and second left intercostal spaces. No tubercle bacilli were demonstrable. Fluoroscopy of the esophagus showed that the latter was pushed over to the right of the level of the pulmonary lesion.

On September 14, 1937, exploration of the left thoracic cavity was made by an anterior approach between the second and third ribs. A tumor occupied the entire three-fourths of the upper part of the mediastinum, and was confluent with an adherent mass in the upper left lobe. In view of the inoperability of the tumor, fifteen seeds of radium emanation were implanted into the mediastinum. The primary tumor was probably in the periphery of the left upper lobe.

A biopsy of the mediastinal mass was taken and, microscopically, it was a Grade IV tumor, probably a bronchogenic metastasis.

The general condition seemed fair during re-

Fig. 13.

Gradual development of carcinoma on the ear of a rabbit, induced by tobacco tar. In Fig. A only the right ear of this rabbit is shown with the tumor developed after 9 months of painting with tobacco tar. Fig. B shows an infiltrative and destructive growth appearing on the outer side of the same ear. Fig. C illustrates the more advanced stage of the same experimental tumor at the end of 15 months. The marked degree of tissue destruction is obvious. (Photo by Roffo)



peated check-ups, the radon seeds having apparently helped the mediastinal obstruction. In August, 1938, he complained of pain in the left forearm, with numbness in the fifth finger. His cough was becoming worse, and was accompanied by nausea and vomiting. He subsequently developed a classical Horner's syndrome. The patient continued to lose weight, and all symptoms grew progressively worse. Death ensued shortly afterward.

Case II. F.R.P., a male, aged fifty-four, reported to the Clinic, in March, 1940, with a history of having had a slight cough for two or three years. During the past three months there had been some pain in the left shoulder, radiating to the hand. The patient was losing weight and had moderate hemoptyses. Roentgenograms, taken elsewhere, showed marked infiltration in the left upper lobe, with a large cavity just below the level of the clavicle, strongly suggestive of pulmonary tuberculosis. One positive sputum was obtained. The best method of treating the condition appeared to be an upper-stage thoracoplasty. At operation, there was found, between the third and fourth ribs, a protrusion about the size of a small egg, grossly suggestive of a neoplasm.

Pathologic examination revealed bronchogenic carcinoma, Grade II. No tuberculosis was found at any time in the many tissues involved.

Shortly before his death a classical Horner's syndrome developed, probably as a result of the spreading neoplasm. The patient died three months post-operatively.

Case III. A. H., a male, aged thirty-nine, complained of pain in the chest, chronic cough, and loss of weight during the six months preceding his visit to the Clinic (October, 1941). Roentgenograms revealed atelectasis and fluid in the left side. Bronchoscopic examination demonstrated a neoplasm involving the left main bronchus. Operative exploration was undertaken through an anterior approach. Adhesions were found throughout most of the pleural space, which were unusually dense over the left lower lobe, where they were firmly adherent to the chest wall and diaphragm with numerous metastatic implants. Surgical removal was not possible.

A biopsy of the lung showed bronchogenic carcinoma, Grade III.

The patient died, January 2, 1942, with generalized metastases involving the pericardium, pleura, pancreas and stomach, with the primary site in the left lung.

Summary and Conclusions

BRIEFLY evaluating the data at hand, the close relationship between cancer



Fig. 14.

Right ear; a, b, c, d,—tumors in distinct stages of development. (Photo by Roffo)

Left ear. After 410 days. (a) carcinomatous infiltrating formation with perforation of the ear, and development on the posterior surface.

(b) Small papilloma on the hairy surface. (Photo by Roffo)

of the respiratory tract and the irritation produced by tobacco smoke or, for that matter, by any type of combustion gas, is too obvious to be ignored, and it hardly requires further elucidation.

The logical conclusion to the points

expounded in this paper appears to be, therefore, that an attempt at prevention, rather than cure, should be made. Cure, while necessary in cases of cancer already established, may become superfluous if timely preventive methods are employed. It is difficult to establish statistically how many cases of cancer might have been prevented by proper handling of the pre-cancerous stage, but their number is certainly great. A closer cooperation between physicians and patients will be necessary to accomplish cancer prevention. Patients with a highly developed susceptibility or favorable biological

soil for the the growth of cancer cells should realize that cessation of smoking, though involving some sacrifice at first, may save them years of suffering. The slogan "Cancer is curable" is not enough, for cancer can be prevented.

"Facts are stubborn things," and almost always are accepted; when the known biological behavior of many forms of cancer is analyzed, it is obvious that the quotation "Cancer is curable" is just not correct in all cases. I am wholeheartedly in accord with the opinion that all efforts should be made to prevent the laying of the foundations for a biological soil which

might produce cancer, because in spite of all known methods available in medicine today, we have no recognized cure for many forms of cancer. I feel certain that this false feeling of security created by accepting the slogan "Cancer is curable" leads at times to infinite harm. To further clarify this misconception we make constant pleas for early diagnosis. However, diagnostic signs in many forms of cancer, when they become obvious to the patient, are well advanced biologically; in other words, the cancer cells might have spread to other parts of the organism far removed from the original site of cancer. Again in the present state of our knowledge this early spread cannot be detected by any known method in medicine, surgery, or laboratory test.

MODERN medicine stands for preventive medicine, a fact recognized by every farsighted and progressive medical man. Curing disease is like trying to put out a blaze after it has been allowed to spread. The thing to do is to prevent a blaze by careful management. Cancer spreads like wildfire—to curb it, mutilating surgical interference is necessary, and even that, at times, may be too late.

A joint and united action by the medical and dental professions, and by human

society as a whole, is urged, if the scourge of cancer of the lung and oral cavity is to be eliminated. At present, deaths from cancer are increasing steadily. The time to stop a further increase is now.

This philosophy in dealing with the cancer problem might seem iconoclastic, but my attitude is far removed from such reasoning. I confidently feel that most people have been lulled into a false feeling of security which can prove disastrous because they feel that, if cancer is acquired, it can be easily cured. This, of course, is not always true. The soundest and finest, and the most ethical, type of medicine is preventive, and although it may lack some of the passing glamour of the more spectacular methods of cure, it can save many patients from experiencing much unnecessary misery and suffering.

Notes.—

DR. A. H. Roffo writes: "You have given a perfect interpretation of my

Fig. 15.

Left ear of the rabbit after 15 months. Most advanced stage; taken one month after Fig. 14 was made. Nodular growth of the neoplastic masses and rupture of the orifice. Inner surface.

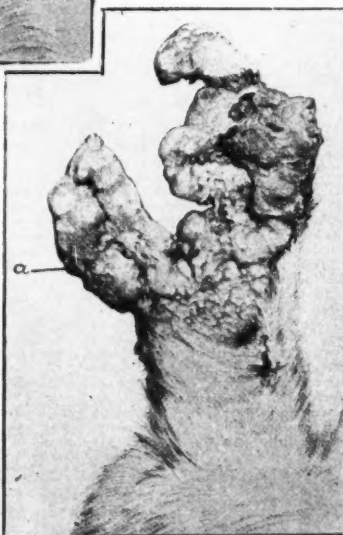


Fig. 16.

Left ear: only a small stump of the tumorous vegetating mass of the ear remains. Outer surface. (Photo by Roffo)

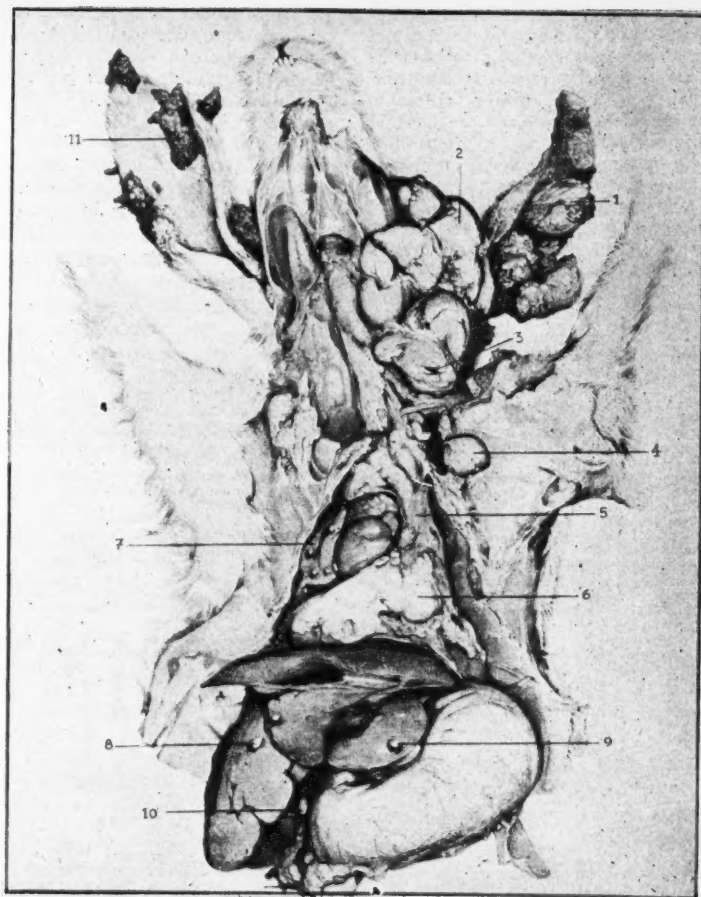


Fig. 17.

Autopsy of the same animal as in Figs. 14, 15 and 16 showing numerous metastases produced by neoplastic lymph embolization with metastatic tumors

1—remnants of the left ear with its carcinomatous mass

2—metastasis in the pre-auricular ganglia

3—Metastasis in the ganglia of the neck

4—metastasis in the ganglia of the axilla

5—metastasis in the mediastinum

6—left lung, completely transformed into a tumorous mass

7—nodular metastasis in the right lung

8, 9, and 10—metastasis in the liver

11—tumorous papillomatous formation in the right ear

(Photo by Roffo)

research on these lines. Your case reports are a fine example of the clinical problem and confirm my opinion that every day more evidence is accumulated to prove the influence of tobacco smoking upon the

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production of lung, larynx and mouth cancer. Now that experiments have shown the action of this carcinogenic agent, I believe that all clinicians should take this factor into account as seriously as you

have done because of the great social importance involved; a more intensified and vigorous antitobacco campaign should be carried out as a direct means for the control of cancer. When smokers object to cessation of smoking because of the fact that many smokers become very old without having cancer, the physician in charge of such cases should explain that all smokers do not develop cancer because they lack the factor of susceptibility (S), which is necessary in the presence of a carcinogenic agent (A), in order to produce cancer (C). The formula of this equation is therefore: $S + A = C$."

A similar formula has been suggested by Cramer (Cramer, W.: The origin of cancer in many. *J.A.M.A.*, 119:309, 1942),

Roffo, A. H. Experimental pulmonary Cancer induced in the Rat by Respiration of Petroleum Combustion Gases. *Bol. Inst. exper. estud. cancer*, 16, 77-87, April 1939.

Idem: Experimental gastric Cancerization by Fuel-Oil Distillate. *Bol. Inst. Med. exper. estud. cancer*, 18, 487-558, Sept., 1941.

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Idem: Correlation between carcinogenic Action of Tobacco Tar and Coal Tar. *Prensa Med. Argent.* 28:1003, May 7, 1941.

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when he states: "The relationship between the two factors susceptibility and carcinogenic agent can be expressed crudely by a simple equation of two variables, A and S, and a constant, C: $A \times S = C$. In such an equation the one variable increases as the other diminishes. If A represents the carcinogenic agents, S the susceptibility, and the constant C the carcinogenic effect, the equation expresses the fact that cancer can arise in an organism either with a high susceptibility and a weak carcinogenic stimulus, or with a low susceptibility and a strong carcinogenic stimulus. The equation reads therefore Carcinogenic agent \times Susceptibility = Carcinogenic Effect."

26, 1941.

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Roffo, A. E., Jr. Carbon Monoxide in Patients with Carcinomata. *Bol. Inst. Med. exper. estud. cancer*, 18:559-68, 1941.

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Dr. Thomas Parran, Surgeon-General, U. S. Public Health Service, on Handicapped Men

FROM what I have seen in our Army, Navy and Public Health Service Hospitals, very few handicapped men want to become the permanent wards of the Government and spend the rest of their days in idleness. They have worked hard. They have stood on their feet and slugged it out with the enemy. They have endured more than they dreamed it was possible to endure. They will ask of us—and they will have every right to ask it—useful work which they are mentally and physically able to do.

Industry, however, needs to retool its thinking before retooling its machinery for postwar production. In the past men have been ruled by the needs of the machine. After the war, jobs, tools, machines and national planning must be fit-

ted to the men who fought to preserve the nation.

There is another thing to consider: Many of our fighting men have learned new skills. So far as is humanly possible, they should go on from there. Men who have learned the intricacies of radar will not be satisfied peddling magazine subscriptions. Men who have flown bombers will not be happy untangling red tape. Men who have learned to build and use the lightning calculators used in anti-aircraft fire will not accept with grace a job pushing buttons on electric elevators.

The end of the war may be near or far away. The world that follows the war will be what we choose to make it, beginning now. Certainly it will be different. We must adapt a rich and vigorous part of that changed world for the participation of those men who have returned and will in increasing numbers return from the battlefronts, broken of body but high of heart.

GYNECOLOGY

A Simple Office Test for Uterine Cancer Diagnosis

J. ERNEST AYRE (*Canadian Medical Association Journal*, 51:17, July 1944) has found that uterine cancer can be diagnosed in many instances by the vaginal smear method described by Papanicolaou and Traut. Still better results are obtained by the author's modification of this method, in which a smear is also taken directly from the external os of the cervix. In the author's procedure, a vaginal smear is first taken using the technique described by Papanicolaou. A smear is then taken from the external os, using a bi-valve speculum and a pipette 6 inches long that is slightly curved at the end and attached to a 2½ inch rubber suction bulb. The patient should not have been examined vaginally or had a vaginal douche on the day that these smears are taken. With the aid of the speculum, the cervix is adequately exposed, and the mucus from the external os is "sucked into" the pipette, and transferred to a slide for fixation and staining. In some cases, the diagnosis of cancer can be made from the smear "at a glance," just as in the case of certain biopsies. In the earlier cases, however, normal cells predominate, and the abnormal cancer cells must be carefully sought. In cancer of the cervix the atypical cells vary in shape and size; various elongated or "tadpole" cells are found. The most significant change is in the nuclei which show changes in size, shape and the arrangement of the chromatin granules. Mitosis is sometimes, but rarely, found. The presence of either blood or blood-pigment is considered a prerequisite for the diagnosis of cancer. Leukocytes are usually numerous and many occur in clumps; histiocytes are usually present; and eosinophils are more numerous in cancer cases than in normal

smears. In fundal carcinoma, the smears show similar abnormalities, except that there is less variation in the size of cells, but the nuclei vary greatly in size; the abnormal cells are often found in clumps. Atypical basal cells, characteristic of smears in cancer of the cervix, are not found in fundal carcinoma; but in some cases of fundal carcinoma, the abnormal cells resemble endometrial glandular epithelium, suggesting the diagnosis of adenocarcinoma. The value of the study of vaginal and cervical smears is primarily for early diagnosis; such smears should be made as soon as any vaginal spotting is noted, especially in patients at the menopausal age. The taking of the smears can be done as an office procedure, the slide placed in fixing solution, and sent to the hospital or laboratory for staining and study. The diagnosis of cancer by the smears should be confirmed by biopsy before surgery or radiation therapy is employed. The author has recently studied 75 cases for uterine cancer; 40 were proved to be cancer by biopsy, and of these 38 showed cancer cells in the smear. Two illustrative cases are reported.

COMMENT

Any simplified office method for the early diagnosis of cancer is most important. The vaginal smear method of Papanicolaou and Traut is such a method. It is reliable and easy to perform but requires accurate microscopic interpretation and is the most important contribution to the early diagnosis of cancer of the uterus and cervix during the past century. We have had no experience with the author's procedure, viz.:—smears taken from the external os of the cervix; however, there should be no advantage because the morphology of the epithelial cells to be examined is identical. There is certainly no objection to taking smears from both vagina and cervix, since the chances of a correct diagnosis would thereby

be very materially enhanced. I suspect that we have taken smears from areas about the external os and beyond at the time the vaginal ones were taken. Personally, I have done so without thinking that it required any added technical skill. Be that as it may, the whole point is to take smears from "everywhere" in the vagina, including the cervix, in order to try in every possible to make an early diagnosis, since this offers the only hope of a true and lasting cure of cancer. Fight cancer with knowledge! Develop a cancer "conscience" and you will seldom miss the diagnosis.

H.B.M.

Salmonella Infection in Gynecology

H. C. FALK and G. BLINICK (*American Journal of Obstetrics and Gynecology*, 47:514, April 1944) note that human infection with *Salmonella* organisms, especially *Salmonella typhi* murium, is being reported more frequently in recent years. Septic infections and gastro-enteritis are the most common types of *Salmonella* infection. Pelvic infections with these organisms is rarely reported, but the authors have found 2 cases of postabortal and one case of postpartum sepsis due to *salmonella* reported in literature in addition to 8 cases of infection of the tubes and ovaries and one case each of infected fibromyoma uteri and infected hematocele due to these organisms. They report 2 cases of infection of the tubes and ovaries due to *Salmonella typhi* murium. In the first case, palliative treatment failed to relieve the symptoms, operation was done; a tubo-ovarian abscess was found on the right side, and this ruptured before its removal; cultures from the pus showed *Salmonella typhi* murium. A supracervical hysterectomy and bilateral salpingo-

oophorectomy were done; the patient made a good recovery. In the second case, operation was done on the diagnosis of chronic salpingitis; a bilateral cornual resection was done and a right parovarian cyst punctured. *Salmonella* was cultured from the cornual portion of the tubes. In both cases agglutination tests with *Salmonella typhi* murium were positive, indicating that this organism was of etiologic significance in the pelvic infection and not an accidental contaminant. The symptoms of pelvic infection with *salmonella* are not clinically distinctive and treatment is the same as that for salpingitis caused by other bacteria. Diagnosis is established only by the bacteriological findings and agglutination tests. In one of the authors' cases, the stool was positive for *Salmonella typhi* murium, the first time that this has been observed in pelvic infection. The authors are of the opinion that this resulted from "minute or incomplete" perforation of the ovarian abscess into the rectum.

COMMENT

This report is interesting only from a bacteriological point of view. Pelvic infection with the *Salmonella* organism is evidently so rare that it is negligible from a purely clinical standpoint. Furthermore, these organisms do not produce an inflammatory reaction that is characteristic and hence, perhaps, we have "missed the boat" and never knew enough to suspect the true bacteriology. The authors are to be congratulated for calling the attention of the gynecologist and general surgeon to this group of bacteria and their pelvic habitat. Another demonstration of clever clinicians working in cooperation with a good laboratory—a combination that should exist in every community of our entire country. And don't

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forget—such a combination is a good bulwark against State Medicine.

H.B.M.

Culdoscopy, a New Method for the Diagnosis of Pelvic Disease—Preliminary Report

ALBERT DECKER and T. H. CHERRY (*American Journal of Surgery*, 64:40, April 1944) describe a method for visualization of the pelvic organs by the vaginal route, using a "culdoscope," similar to a peritoneoscope, and a cannula and trochar for puncturing the posterior vaginal wall. After puncturing the vaginal wall and entering the cul-de-sac, the trochar is withdrawn and the culdoscope inserted through the cannula. The patient is in the knee-chest position for this examination, and is supported by shoulder braces, leg holders and thigh straps. Either caudal anesthesia, local anesthesia of the vaginal vault, or local infiltration at the point of puncture with presacral nerve block by the pararectal route may be employed. The Fallopian tubes, ovaries, anterior and posterior surface of the uterus, sigmoid, rectum, broad ligaments, utero-sacral ligaments, promontory of the sacrum, loops of the small bowel, and in some cases, the appendix are visualized by this procedure. It is contraindicated in cases in which puncture of the cul-de-sac does not result in "an inrush of air"; in adherent uterine displacements with fixed masses in the cul-de-sac; in "frozen pelvis"; in acute and subacute pelvic inflammatory disease; and in cases in which cardiac decompensation renders the knee-chest position dangerous. It has been found of special value in the study of "obscure pelvic disorders."

COMMENT

Culdoscopy is ingenious and deserves commendation! Dangerous and requires special skills—first, when not to use it, and second, how to use it. We have never practiced culdосcopy but, from a common sense point of view, we cannot see any advantage over peritoneoscopy which we have performed with varying results—largely negative. We believe a good history and a careful abdominal-pelvic examination, repeated several times when in doubt, are still superior to any instrumental technic of this sort in the diagnosis of pathologic lesions in the lower abdomen and pelvis. We do not deprecate such methods when used in conjunction with routine modes of physical

examination but we do not place very much importance in their use. Such methods will never become routine because of the technical skill required in their use, the cost of the apparatus, and the very limited help in arriving at a correct diagnosis.

H.B.M.

Ovarian Fibromas; a Clinical and Pathological Study of Two Hundred and Eighty-three Cases

M. R. DOCKERTY and J. C. MASSON (*American Journal of Obstetrics and Gynecology*, 47:741, June 1944), in a study of pathological material at the Mayo Clinic, found 312 ovarian fibromas occurring in a group of 283 patients. The incidence of fibroma was slightly more than 5 per cent of all ovarian tumors removed surgically. A review of the clinical histories of these cases shows that 31 per cent of the patients were between fifty and fifty-nine years of age on admission; none were in the first decade of life, and only 2 in the second decade. In the majority of cases, the symptoms of ovarian fibroma developed after the climacteric. The most common symptom on admission was the presence of a visible tumor; usually the patients stated that the tumor had been of slow growth; some, however, had noted "episodic" increases in the size of the mass. This was usually associated with pelvic pain. Pain was the chief symptom in 79 cases, in 43 of which it was associated with a visible tumor mass. In 20 cases, the presence of abdominal ascites was noted on the clinical records, and in 2 of these there was an associated hydrothorax; in several instances the case records noted the possibility of malignancy. Since the treatment of ovarian fibromas is always surgical, no matter how small the tumor, surgical exploration is indicated, when there is any doubt as to the diagnosis. The possibility of a malignant lesion should be considered, and this can be ruled out only by histological examination. The other ovary should always be carefully examined. In the cases reported there were 28 cases of multiple ovarian fibromas, including bilateral single tumors in 23 cases, bilateral multiple fibromas in 2, and unilateral multiple fibromas in 3 cases. The presence of ascitic fluid in the abdomen was noted by the surgeon in association with 51 ovarian fibromas, none less than 6 cm. in diameter. Edema of the tumor or its pedicle or both was present

in 31 of these 51 cases, and central cystic degeneration of the tumor was of much more frequent occurrence in this group than in the cases without ascites. Inter-cellular edema of the tumor, however, was correlated more closely with ascites than gross edema or cyst formation. In agreement with the findings of others, the authors find that all these fibromas of the ovary could be classified as cellular and fibrous, occurring in pure or mixed forms; in all the "basic cell" was the mesodermal type characteristic of the ovarian stroma. Ovarian tissue could be identified in about one-half the tumors in this series. A brownish color and soft consistency was found to indicate malignant change, which occurred in about 1 per cent. Since this study was made, a patient with Meigs' syndrome (ovarian tumor with ascites and hydrothorax) has been operated on at the Clinic, and an ovarian fibroma successfully removed (salpingo-oophorectomy on the side of the tumor). Hydrothorax in association with ascites is not a frequent finding in cases of ovarian fibroma; yet

this possibility must be considered, and the patient should be given the advantage of an exploratory operation, if otherwise the general condition is good.

COMMENT

The incidence of fibroma of the ovary is around 2-3%. The authors, to our surprise, had an incidence of 5% and, again, 31% of their patients were between 50 and 59 years old. In our experience these figures are cut about in half—2.5 and 15%. However, there may well be good reasons for the difference in these figures. The type of patient, for example, who visits the Mayo Clinic may well be quite different from that in New York City. We in New York might get a younger age group, etc., all of which again illustrates the relativity (Einstein!) of all statistics. Other findings of the authors, as well as management, are in agreement with our own concepts of such cases. Any and all ovarian tumors are a source of danger to the host and therefore should be removed. At 50 and older malignancy is always a possibility—often actually present. Consequently, always remember! There is no expectant treatment for ovarian tumors, solid or cystic. H.B.M.

OBSTETRICS

Dicoumarin in the Treatment of Puerperal Thrombosis

ALBERT DAVIS and MARGARET PORTER (*British Medical Journal*, 1:718, May 27, 1944) report the use of the anti-coagulant dicoumarin (3:3 methylenebis-4 hydroxy-coumarin) in the treatment of 43 cases of puerperal thrombosis. These cases were of "every degree of severity," from small saphenous lesions to bilateral femoral blockage. Dicoumarin was given by mouth in doses of 300 mg. daily in three doses at eight hour intervals. Treatment was controlled, as a rule, by daily estimation of bleeding or clotting time; estimation of prothrombin type, which was made in some cases, is a more accurate method of control but is more difficult to carry out in routine ward work. In these cases of established thrombosis it was found that the bleeding and clotting time curves were so closely parallel to the prothrombin time curve that they were adequate as controls. In most of the cases there was an average daily rise in the coagulation time of one minute after the first twenty-four hours of dicoumarin therapy; the effect persisted for only a

few days after treatment was stopped in most instances, but in 2 cases the clotting time remained higher than normal for several months. Owing to the variation in the severity of these cases, the control series of untreated cases was not "an exact parallel" in all respects. However, in the cases treated with dicoumarin there was some relief of pain, a fairly rapid diminution of the edema, and a shortened average hospital stay—fourteen days, as compared with twenty-eight days in the controls. The incidence of pulmonary embolism was reduced from 9 to 4 per cent, and in only one of the treated cases was this of any degree of severity. There were no untoward complications and "no suggestion" of spontaneous hemorrhage in any of the cases treated with dicoumarin. The authors note, however, that theirs is the only considerable series of cases that does not show at least one case of dangerous bleeding. They conclude that the results obtained with dicoumarin in puerperal thrombosis justify its use, but always with careful control by daily prothrombin or coagulation-rate determinations.

COMMENT

Puerperal thrombosis is the "bugbear" of every conscientious practitioner doing obstetrics. We have dreaded it since the first day its pathology was demonstrated during interne days. Today, however, this dread has been somewhat ameliorated because there is a fairly potent therapy, or at least, better than ever existed before, which changes the prognosis from bad to fairly good. The authors report one such method of treatment which, with their precautions, should be potent and safe. Do not use it unless you have access to a good laboratory. Uncontrollable bleeding is far more devastating than thrombosis.

H.B.M.

The Possible significance of Vaginal Smears in the Diagnosis of Certain Disturbances of Pregnancy

WILLIAM SCHUMAN (*American Journal of Obstetrics and Gynecology*, 47:808, June 1944) reports a study of 350 vaginal smears from an equal number of patients in all stages of pregnancy. These smears were obtained by rolling a cotton swab on the lateral vaginal wall, instead of by the aspiration pipette. By the cotton swab technique, the cervical and uterine secretions are eliminated from the smear, which the author considers to be of importance if the histological detail of "a true biopsy" of the vagina is to be obtained. With this method pus is not found in the vaginal smear of normal pregnancy. The chief characteristics of the vaginal smear in normal pregnancy the author found to be the increased size and number of cells, the presence of large numbers of eosinophilic cornified cells and the absence of deep cells. The degree of cornification in a large percentage of normal pregnancies is so pronounced, that the vaginal smear might possibly be employed as a means of diagnosis of pregnancy, if nonpregnant states treated with large doses of estrogen were excluded. The menopause can be easily distinguished from pregnancy by the character of the vaginal smear, and this would be of definite clinical value in cases of sudden amenorrhea in women over forty years of age. The greatest degree of cornification was found in the vaginal smear of a case of hyperemesis; a definitely increased degree of cornification, but not quite so marked, in a case of early hypertensive toxemia. In a case of pre-eclamptic toxemia, however, smaller cells with larger nuclei, resembling basal zone cells, were

present, suggesting estrin deficiency. This is in agreement with the findings of Smith and Smith in their determinations of blood estrin in late toxemias of pregnancy. Different types of smears were found in cases of threatened abortion, suggesting that smears taken before bleeding or other symptoms of abortion occur, may be of value in cases of habitual abortion to determine whether a hormonal deficiency is present as a guide to rational therapy. With increasing knowledge of the biological changes in the vaginal cells and their relation to hormonal variations, the author is of the opinion that changes in the vaginal smear may be found sufficiently clear and definite to warrant the use of the smear as an aid in the diagnosis and prognosis of certain disturbances of pregnancy. The purpose of this report is to "stimulate interest" in this use of the vaginal smear.

COMMENT

We heartily agree with the author that with increasing knowledge of the biological changes in the vaginal cells and their relation to hormonal variations, changes in the vaginal smears may be found sufficiently clear and definite to warrant the use of the smears as an aid in diagnosis and prognosis in certain disturbances of pregnancy. The importance of the diagnostic and prognostic value reposed in the vaginal epithelium—as well as cervical and uterine—is fast coming to the fore, thanks to such studies as this one. Let all who can lend encouragement to such work. It's humanitarian "uplift" of the highest order.

H.B.M.

Spinal Anesthesia to Favor Rapid Dilatation of the Cervix in Obstetric Emergencies

S. S. ROSENFELD (*American Journal of Obstetrics and Gynecology*, 47:699, May 1944) notes that immediate delivery is "imperative" in certain obstetric cases, such as cases of prolapse of the cord or irregular fetal heart. In these cases, the condition of the cervix, in the absence of disproportion, is an important guide to treatment. If it is soft and dilatable, manual dilatation is indicated. In such cases the author has found spinal anesthesia to be the anesthetic of choice, as it has been demonstrated that spinal anesthesia relaxes the cervical muscles so that manual dilatation is facilitated, but at the

same time causes contraction of the muscles of the corpus, so that the blood loss is less than when general anesthesia is used for the same procedure; the child rarely requires resuscitation. Every case of this type requires delivery by a thoroughly trained and experienced obstetrician. The author reports 5 cases in which spinal anesthesia was used when manual dilatation of the cervix was indicated. In 3 cases podalic version was done; and in one case rotation of the occiput by a manual maneuver previously described by the author for occipitoposterior presentation. In the first case labor was induced because of toxemia, and the child was still-born, with beginning maceration; the mother recovered after "a stormy convalescence." In the other 4 cases a living child was delivered and there were no maternal deaths; although one of these patients had subacute bacterial endocarditis, she was still living at the time of this report.

COMMENT

Manual dilatation of the cervix is a bad operation under any and all circumstances. To use it is obsolete. We can think of no operation fraught with more danger to both mother and baby. Spinal anesthesia will not "soften" a firm, partially effaced and dilated cervix, nor will it "cause" uterine contractions. It is true that spinal anesthesia, as will any general anesthesia, promotes or facilitates cervical dilatation (physiological or manual) provided there is already considerable effacement and dilatation. So will "time" and morphine. There are other less traumatic and therefore safer ways of delivery that may be resorted to, provided, of course, the patient has a competent doctor. If such is not the case, consultation is certainly in order. Do not perform accouchement force unless the cervix is nearing full dilatation, and not even then unless there is no other way out. Indicated: Once in a lifetime!

H.B.M.

Accelerated Postpartum Involution of the Uterus with Vitamin B Complex Therapy

L. H. BISKIND and M. S. BISKIND (*Western Journal of Surgery, Obstetrics and Gynecology*, 52:266, June 1944) in previous studies have found that dietary deficiency of vitamin B was often associated with clinical syndromes of excess estrogen. This is attributed to the liver's inability to inactivate estrogen in vitamin B deficiency. It was found that the

clinical symptoms associated with excess estrogen were relieved by vitamin B complex therapy. Among the patients successfully treated for menorrhagia with vitamin B complex, there were several with a history of postpartum uterine subinvolution and persistent bleeding. Various studies have indicated that the diet of American women is apt to be deficient in vitamin B complex, especially in pregnancy, when the demand for this vitamin is increased. The authors have recently studied postpartum involution of the uterus in two groups of women, one group on an average diet during pregnancy, the other receiving "substantial" supplements of vitamin B complex, usually throughout pregnancy, at least for three to six months. In other respects prenatal care, delivery and postnatal care were carried out on the same general lines in both groups. On bimanual examination for the degree of uterine involution six weeks postpartum, involution was characterized as poor if the uterus was soft, boggy, definitely larger than normal, and often retroverted; as fair, if the uterus was soft, moderately enlarged, and usually in good position; as good, if the uterus was firm, normal in size and usually normal in position; as excellent, if the uterus was unusually firm, normal in size, freely movable, and normal in position. In the 107 women not given vitamin B complex during pregnancy, there were 6 (about 5 per cent) with poor involution; 23 cases (about 22 per cent) with fair involution; and 78 cases (about 73 per cent) with good involution, but none with excellent involution. In 76 women given vitamin B complex during pregnancy, there were none with poor involution; only 3 (about 4 per cent) with fair involution; 56 (about 74 per cent) with good involution; and 17 (about 22 per cent) with excellent involution, or about 96 per cent with satisfactory involution. Only one of the patients who received vitamin B showed any postpartum bleeding, and this consisted only in "moderate increase" of the lochia beginning thirty-six hours after delivery and lasting two days. There were no cases of subsequent menorrhagia in this group. In the group not receiving vitamin B complex during pregnancy, 3 had postpartum hemorrhages, followed by menorrhagia in 2 instances; one had irregular "spotting" for six weeks after delivery; and one had menorrhagia six months after delivery. On the basis of

these findings the authors conclude that postpartum subinvolution of the uterus is due indirectly to nutritional deficiency resulting from "the increased, but unsatisfied" demand for vitamin B complex in pregnancy. This deficiency leads to failure of inactivation of estrogen by the liver, and resulting excess of estrogen prevents normal involution of the uterus. The administration of vitamin B complex during pregnancy, therefore, results in a "significant diminution" in postpartum subinvolution of the uterus and its sequelae of postpartum hemorrhage and subsequent menorrhagia.

COMMENT

Just what percentage of the cases of postpartum subinvolution, with its associated symptoms, is due to nutritional deficiencies is, of course, impossible to determine. Yet the percentage must be very high. Any study, therefore, that throws any light on the subject and suggests a rational treatment—preventive or curative—is important. The authors have "a case" for the promotion of good postpartum involution by the administration of adequate vitamin B complex during pregnancy. It is easy, inexpensive and should not be too irksome for the patient. Try it. Prevention is always better than cure.

H.B.M.

RHINOLARYNGOLOGY

pH of Nasal Secretions in Situ in Atrophic Rhinitis; Its Implications

N. D. FABRICANT (*Archives of Otolaryngology*, 39:474, June 1944) notes that atrophic rhinitis in its earlier stages is characterized by a chronic inflammatory process, which histologically does not always show distinguishing features, but is frequently identified by a definite tendency toward a squamous cell type of epithelial metaplasia, progressing along the surface of the mucous membrane, interfering with ciliary action, so that the nasal secretions, normally removed by the cilia, tend to adhere to the mucous membrane. As the process advances the basement membrane is thinned out and the characteristic round cell infiltrations about the glands are found "scattered through" the connective tissue. In the more advanced stage of the process the thickening and fibrosis of the arteries, characteristic of atrophic rhinitis, appear; in this stage the epithelium degenerates and may be completely lost; dense fibrous tissue lies beneath the altered epithelium, producing the atrophic condition of the mucosa. In the final stage, the glands are replaced by undifferentiated fibrous tissue and the bone undergoes fibrosis and degenerative changes. The author has determined the pH of the nasal secretions in 7 cases of advanced atrophic rhinitis when there were crusts in the nose; each patient was studied on three separate days, nasal pH readings being taken minute by minute for forty-five minutes; only one patient was studied

when the nose had been cleared of crusts. The pH readings when crusts were present in the nose ranged from 6.81 to 8.43, definitely higher (more alkaline) than the normal range of 5.5 to 6.5. In the case in which the nose was cleared of crusts, the nasal pH ranged from 6.35 to 6.68, more nearly normal. On this basis, the author suggests that preparations used for nasal application in atrophic rhinitis should be such as to produce a normal, slightly acid nasal secretion.

COMMENT

According to Fabricant's previous publications most of the abnormal conditions of the nasal mucous membrane are characterized by excessive alkalinity. How significant this may be in the study of the etiology of atrophic rhinitis is not known but these observations have been of value in choosing medicaments for local therapy.

L.C.McH.

Diagnosis and Treatment of Sinusitis in Children

D. E. STAUNTON WISHART (*Laryngoscope*, 54:97, March 1944) has found that sinusitis frequently occurs in children. One of its most common signs is recurrent head colds; protracted fever occurring during a cold suggests the presence of sinusitis. Nasal obstruction and discharge are also symptoms of sinusitis, but other causes of these conditions must be considered. If the nasal discharge is always from the same side, there is either foreign body, nasal polyp, or sinusitis. Constant or recurring nasopharyngitis,

postnasal drip, and cough that is worse at night or just after waking in the morning are common symptoms in sinusitis. Older children may complain of chronic headache. Impairment of the sense of smell and conjunctivitis affecting one eye indicate ethmoiditis. For the diagnosis of sinusitis in children, the nasal examination should be completed by spraying the nose with an isotonic solution of ephedrine in saline and directing the patient to blow each side of the nose into a separate dish; in some cases thick, tenacious material is evacuated or even pus from one side by this procedure. After the local application of cocaine, the nasopharyngoscope is used; the visualization of a "thin ribbon" of cloudy secretion, the so-called "pus streak," establishes the diagnosis of sinusitis. Transillumination is done both before and after this nasal examination. Roentgenograms are made unless the diagnosis is "obvious"; in some cases radiopaque solution is used in the maxillary sinus. In the treatment of sinusitis in children, nose drops and nasal irrigation are both of value; the mother should be carefully instructed in the method of giving such drops and irrigations. Any solution used in the treatment of the nose should have a pH slightly on the acid side—similar to that of the normal nasal mucosa; warm isotonic saline is used for irrigations. Because the anterior ethmoid cells, the frontal sinus and the maxillary sinus all drain "into a common gutter," the middle meatus, the author has found the lateral head low position the best for the application of ephedrine for shrinking this meatus and establishing drainage of these sinuses. After spraying the nose with $\frac{1}{2}$ per cent ephedrine in normal saline, the child is placed in the lateral head low position and five or six drops of a 1 percent solution of ephedrine in normal saline dropped into the nose on the low side. This method has been found to be the best form of nasal treatment for sinusitis in children. The author does not employ the Proetz displacement method in children. For the severer forms of maxillary sinusitis, he advocates aspiration and irrigation of the sinus by puncture of the nasocentral wall; in the author's opinion the maxillary sinus

should never be irrigated through the middle meatus in a child. Sulfa drugs may be employed in the early stage of acute sinusitis, but their use should not be prolonged, as there is danger of the sinusitis becoming chronic if the infection is not overcome promptly. Radical surgery may be necessary in some cases of sinusitis in children, but operation should be done only on definite indications in each case, and the procedure employed should be as conservative as possible.

COMMENT

An excellent resume of the sinus problem in children. We completely agree with the author's conservatism.

L.C.McH.

Acute Tonsillitis; Treatment by Rectal Administration of a New Bismuth Compound

J. S. STOVIN (*Archives of Otolaryngology*, 39:259, March 1944) notes that others have reported that bismuth given by intramuscular injection is effective in the treatment of acute tonsillitis, although it is not known how bismuth acts in these cases. The author has found that a new bismuth preparation, the bismuth salt of heptadienecarboxylic acid, is well absorbed when given by rectum in suppositories. The suppositories used for adults contain 0.135 gm. of this bismuth salt (0.045 gm. of metallic bismuth); those used for children, one half this dose. Sometimes one suppository is sufficient to relieve the symptoms; in other cases a second suppository is employed twenty-four hours later; more than two suppositories are rarely necessary. While the acute symptoms of tonsillitis clear up as a rule within twenty-four to forty-eight hours with this treatment, the follicular exudate and enlargement of the cervical glands subside more slowly. The same treatment has proved effective in secondary infection developing in tonsillar remnants ("tabs") and granulation tissue after tonsillectomy. The author reports 10 illustrative cases.

COMMENT

The results seem similar to those obtained with sulfadiazine.

L.C.McH.

OTOLOGY

The Industrial Noise Hazard

D. A. McCOY (*Archives of Otolaryngology*, 39:327, April 1944) has made special audiometric tests of men working with chipping hammers at a large shipyard, as the chipping hammer is the chief source of noise hazard in this industry. Preliminary audiometric tests were made before employing men at this work and only those with no history of previous exposure to noise, or of disease of the nose, throat, or ear and those with normal audiograms were selected. After seven hours' work at the "chipping school," these workers reported a distinct loss of hearing with tinnitus and a feeling of discomfort in the ears. By the next day these symptoms had disappeared, and audiometric tests showed only a slight loss of hearing. After one month's exposure to the noise of the chipping hammers (100 to 130 decibels of noise), the audiometric tests showed a definite hearing loss for the high tones; this was not improved by a rest of one or two days. After a year's work chippers showed a more extensive loss of hearing of the same type (high tone loss). On the basis of these findings, the author concludes that all workers exposed to 100 decibels of noise or over in their daily work must be protected against noise, not only for the preservation of their own hearing but also in the interests of increased production. Where this cannot be done by the use of acoustically treated booths or rooms, efficient ear stoppers must be employed. The cotton stoppers used by some workers do not really protect against dangerous levels of noise; some of the ear stoppers that have been employed cause discomfort and points of pressure so that workers protest against using them for long periods. Effective ear stoppers that do not cause discomfort should be developed. In some instances modified plastic lucite ear molds have been tried with good results.

COMMENT

Right! Then we need only persuade the workers to wear the stoppers. That is quite a problem too.

L.C.McH.

Blast Injuries of the Ear

L. E. SILCOX and H. P. SCHENCK (*Archives of Otolaryngology*, 39:413, May

MEDICAL TIMES, NOVEMBER, 1944

1944) report a study of 82 cases of blast injury of the ear in Navy personnel, due chiefly to aerial bombs and "immersion blast" (depth charges when the subject is under water). Some degree of deafness was present in most of these cases, but the deafness was usually greater when the tympanic membrane was not ruptured than when rupture had been caused by the blast. The authors are of the opinion that much of the initial concussion is dissipated if the drum ruptures, and the cochlear structures are thus partially protected from injury. Audiograms showed that the deafness in the majority of these cases of blast injury to the ear was characterized by loss of hearing in the higher frequencies; the tonal dip at 4096 cycles characteristic of cochlear damage due to prolonged exposure to noise (such as industrial noise) was not found in many of these cases. In cases with secondary infection following rupture of the ear drum, there was also an element of conduction deafness. The ear drum was ruptured in 58 of these cases; suppurative otitis media developed in 35 of these cases. This high incidence of infection was due to the fact that at the time of injury most of these patients were either in fox holes or floating in contaminated water. The authors suggest the advisability of prophylactic application of microcrystals of sulfathiazole either in powder or suspension as soon as possible after traumatic rupture of the ear drum. These cases of suppurative otitis media were treated by insufflation of microcrystals of sulfathiazole or instillation of the suspension into the external meatus; none developed mastoiditis. In the cases of deafness due to the blast injury, inflation of the eustachian tube often relieved tinnitus and improved hearing, especially if the drum was not ruptured. Deep diathermy, vitamin B concentrates and rest proved valuable aids in treatment.

COMMENT

An interesting and instructive report.

L.C.McH.

Some Dangers of Sulfonamides in Ear Infections

A. R. DINGLEY (*British Medical Journal*, 1:747, June 3, 1944) is of the opinion that in acute otitis media, when the

ear drum is bulging and pulsating, myringotomy should be done and drainage established before a sulfonamide is employed. The appropriate sulfonamide should then be used according to the bacteriological findings, if fever continues; this should be given in full dosage day and night, but not after the second week. If the ear is still suppurating or if deafness persists after this time, it is evident that the infection has not been overcome and that surgical drainage of the mastoid is necessary; continuation of the sulfonamide therapy only masks the symptoms of mastoid involvement. If a sulfonamide has been given before myringotomy has been done, the ear drum must be carefully watched, and if bulging is evident and continues, a myringotomy should be done, even if the symptoms are subsiding. It should be remembered in every case of otitis media that sulfonamides are not a substitute for surgical drainage when this is indicated. When sulfonamides have been given, mastoid tenderness is often absent or is manifested late, even when the mastoid is extensively involved. X-ray examination of the mastoid should be done in every doubtful case. Lateral sinus thrombosis, meningitis or brain abscess may develop after a latent phase. The author reports 3 illustrative cases showing the various complications that may develop in otitis media when sulfonamides are used in treatment without myringotomy.

COMMENT

We agree. The sulfonamides do not take the place of indicated surgical drainage of suppurative conditions. If they are going to cure an acute infectious condition they will certainly do it within two weeks. Acute ear and mastoid infections must be watched much more carefully for incipient complications when sulfonamides are being given.

L.C.McH.

Injection of the Tympanum for Chronic Conductive Deafness and Associated Tinnitus Aurium

B. C. TROWBRIDGE (*Archives of Otolaryngology*, 39:523, June 1944) briefly reviews the methods employed of treating deafness and tinnitus by injection of drugs into the tympanum. The author has employed ethylmorphine hydrochloride for injection into the tympanum because of its vasodilator and lymphagogue action, and because it also has an anal-

gesic effect which diminishes the discomfort of the injection and of the subsequent inflammation. This method of treatment is indicated chiefly in chronic non-suppurative inflammation of the middle ear with deafness of the conductive type; it may also be used in cases of previous suppurative otitis media in which the ear has become "dry," but deafness persists. The treatment is of value only if the loss of "practical" hearing is not too great; as in profound deafness, even considerable improvement would not bring the hearing to a useful level. The loss of hearing for low tones should not exceed 30 decibels at the 256, 512, 1024 and 2048 frequencies. The vestibular mechanism must be normal as shown by caloric tests; the tympanic membrane must be intact; and the external auditory canal normal. Prior to the injection into the tympanum, an aniline-oil-cocaine solution is applied on a wick to the tympanic membrane to produce local anesthesia. The external canal is wiped clean after removal of the wick. The patient lies in a semirecumbent position; a tuberculin syringe and a No. 26 M. P. 1½ inch (3.8 cm.) needle are employed; 4 minims (0.25 cc.) of a 1.5 per cent solution of ethylmorphine hydrochloride are injected into the tympanum through the posterior inferior quadrant of the tympanic membrane. The patient is instructed to hold his head back and open his mouth widely immediately after the injection; the mouth may be closed within a few minutes, but the head should be held back for approximately ten minutes. The author has found that few reactions follow this treatment; patients rarely complain of pain but sometimes note a feeling of fullness in the ear; the tympanic membrane shows inflammatory changes within six hours, which subside completely within four days. Subsequent treatments are given at four to seven day intervals using 1.5, 2.5, 3.0 and 3.5 per cent solutions of the drug. In 22 cases treated by this method, improvement in hearing, as shown by audiometric tests before and after completion of treatment, was obtained in 18 cases; in 9 of the cases in which there was associated tinnitus, this was completely relieved in 3 cases and definitely diminished in the remaining 6 cases. The patients who showed improvement in hearing by audiometric tests also noted a definite subjective improvement. In most cases the

maximum improvement occurred about six weeks after the last injection. As yet no definite statement can be made as to the extent to which hearing can be improved by successive series of injections. These preliminary studies indicate, however, that a very definite improvement is possible in properly selected cases.

COMMENT

Several years ago thyroid extract was used in a similar manner. The rationale of the treatment was not explained and it fell into discard. It will be interesting to see whether this treatment will prove to be of lasting value.

L.C.McH.

The Use of Sulfa Drugs in the Mastoidectomy Wound Where Complete Closure Is Employed

A. J. HERZIG (*Laryngoscope*, 54:199, May 1944) reviews various methods employed for complete closure of the mastoidectomy wound; recently sulfonamides have been employed in such cases. As in all mastoid operations, the mastoid cavity must be thoroughly exenterated. Care must be taken that no bone, blood clot or other "debris" is left in the cavity, but the author does not use any chemical or saline to flush the wound. After hemostasis is complete, the wound is dried with gauze; the cavity must be completely dry. The mastoid cavity, including the antrum, is then packed with equal parts of sulfanilamide and sulfathiazole powder; more of the powder is dusted on the periosteum when closed. The skin is then

closed with silkworm gut or Michel clips, and the sulfonamide powder dusted on the closed wound. Some of the powder is placed in the external auditory canal before the wick is introduced. The usual mastoid dressing is then applied. The skin sutures and clips are removed on the fifth day and no further dressings are required. In the cases in which this method has been used, the aural discharge ceased on the fourth day. There was no toxic reaction to the sulfonamide in any case; a slight leukopenia (20 per cent) and a 10 per cent reduction in red cells were noted about the fourth or fifth day, but blood counts were normal within forty-eight hours. The author reports 7 cases in which this method was used. The youngest patient was five months of age, the oldest forty-nine years. The chief advantage of this method of closure of the mastoidectomy wound is the rapidity of healing without dressings which are disturbing to the patient, especially to children. The time of hospitalization is shortened; and there is no postaural depression or deformity.

COMMENT

In our experience, packing of the mastoid cavity with a mass of sulfanilamide powder has not been as successful as dusting the cavity walls thoroughly and then allowing the cavity to fill with blood before completely closing the skin wound. Certainly where this method of closure is successful postoperative care is very much simplified and hospitalization greatly shortened.

L.C.McH.

PEDIATRICS

Influenzal Meningitis

McLEMORE BIRDSONG and his associates at the University of Virginia Hospital (*American Journal of Diseases of Children*, 67:194, March 1944) state that influenzal meningitis caused by the strains of *H. influenzae*, is one of the types of meningitis prevalent in children. Six strains of *H. influenzae* have been described as causing meningitis, types a, b, c, d, e and f. Type b is the most frequently found to be the causative organism in influenzal meningitis, but the authors have seen one severe case due to type f. Eight cases of influenzal meningitis are reported,

in all of which treatment with a sulfonamide, sulfadiazine in all but one case, was given as soon as the diagnosis of meningitis was established. The dosage of sulfadiazine by mouth was 1 to 1½ grains (0.06 to 0.09 gm.) per pound (0.5 kg.) body weight daily, as long as there were signs of active infection. In patients who were very ill, sodium sulfadiazine was given intravenously on beginning treatment; if the patient was much dehydrated Murphy drip infusion was given intravenously or into the bone marrow. As soon as the organism was isolated from the spinal fluid and typed, type-specific

anti-influenzal rabbit serum was given intravenously; the initial dose was 50 mg. The need for further serum therapy was determined by the patient's clinical condition, the number of bacteria in, cell count and sugar content of the spinal fluid, and the agglutination test of the organisms isolated from the spinal fluid against the patient's serum. The authors have found that moderate agglutination with the test indicates effective serum therapy. In the 8 cases reported, 7 patients recovered. In the one fatal case, the infection was severe and fulminating, and serum therapy was not begun until late in the disease, so that this cannot be considered as a failure of serum therapy. The recovery of the other 7 patients is attributed to the use of type specific serum.

The Prophylactic Use of Sulfanilamide in Children with Inactive Rheumatic Fever

K. G. DODGE, J. S. BALDWIN and M. W. WEBER (*Journal of Pediatrics*, 24:483, May 1944) report the prophylactic use of sulfanilamide in 88 children and adolescents with quiescent rheumatic infection for 181 patient-seasons. Sulfanilamide was given daily in doses of 1 to 2 gm. in divided doses; 2 gm. were given only to the larger adolescents; 1 gm. to 3 of the smallest children. The usual dose was 1.3 gm. (20 grains) daily for children weighing under 110 pounds and 1.6 gm. for children weighing over 110 pounds. Toxic reactions to the drug were slight, and it was not necessary to discontinue its use in any instance because of toxicity. In several instances in which the sulfanilamide was discontinued for other reasons and then resumed, and in 2 children treated for pneumonia with sulfadiazine, there was no evidence of sensitivity to the drug. In a control group of 101 children with inactive rheumatic fever observed for 135 patient-seasons during this study, 54 developed Group A hemolytic streptococcus infections, and there were 19 definite "major rheumatic relapses," with 2 deaths and 7 mild or possible relapses. In 3 children the rheumatic process remained active for the greater part of the period of observation, with one death from subacute bacterial endocarditis. In the group of 88 children given sulfanilamide prophylactically for 181 patient-seasons, only 5 hemolytic streptococcus infections occurred, and 2

children developed definite rheumatic relapses. Two other children with severely damaged hearts died of congestive failure, without evidence of streptococcus infection or active rheumatic fever. Two children showed signs of increasing rheumatic activity within two weeks after beginning the sulfanilamide therapy; in these cases sulfanilamide was continued, the attacks were mild and the signs of active disease subsided gradually. These results and those reported by others in the literature indicate that sulfanilamide prophylaxis is definitely effective in preventing activation of rheumatic fever, and the authors are of the opinion that it should be more widely applied under close observation and proper safeguards.

Rocky Mountain Spotted Fever In Children

J. V. COOKE (*Yale Journal of Biology and Medicine*, 16:495, May 1944) notes that Rocky Mountain spotted fever has spread from the northwestern states to the central, eastern and southern states, so that at present at least scattered infections have occurred in all parts of the United States except the New England states, Michigan and Wisconsin. Almost half the cases outside the Rocky Mountain endemic area occur in children under fifteen years of age. Ten cases of Rocky Mountain spotted fever occurring in children in two St. Louis hospitals are reported. All of these cases occurred during the summer months, and all the children had been bitten by ticks. The chief prodromal symptoms before the appearance of the rash were fever and anorexia; some of the children complained of headache, abdominal pain, pain in the neck or extremities. The fever reached a high level before the rash developed. The rash was noted first on the ankles and wrists, arms, lower legs or the face, then spread more or less rapidly to the entire body with involvement of the palms and soles. The individual lesions of this eruption were discrete, "pale rose-red" macules, only rarely becoming slightly raised, or maculopapular. When the rash disappeared, no definite pigmentation persisted. The fever ranged from 39° C. to 40° C., or above, but in spite of high temperature, 6 of the 10 children showed no signs of general toxicity and did not appear ill.

One child had vague "aches and pains," and 2 showed neurologic symptoms, being semi-comatose, and when aroused, delirious, disoriented or irritable. There was one death in the series, a boy sixteen years of age, who developed bronchopneumonia. White cell counts showed a moderate leukocytosis, average 11,600, ranging from 11,000 to 33,500, with one case of leukopenia (6000 white cells), but the differential count showed a "constant and striking" shift to the left, which in all but one case was of the hyper-regenerative type. This characteristic blood count has not been previously emphasized as a symptom of Rocky Mountain spotted fever. All of these patients developed agglutinins to *Proteus* X19 by the second week, with the titer rising higher in the third week of the disease. As a rule the rash of Rocky Mountain spotted fever is so typical in children that there is little difficulty in diagnosis.

Oral Deallergization of Food Allergy with Propeptans

E. URBACH (*Archives of Pediatrics*, 61:184, April 1944) has found in his experimental work that in cases of specific food protein allergy, the specific protein derivatives, propeptans, given by mouth, produce desensitization (deallergization). The propeptans employed are derived from the individual proteins by digestion with hydrochloric acid, pepsin and trypsin; so prepared, they contain proteoses chiefly, also peptones, simple peptides and amino acids. Propeptans are employed to determine the food or foods to which the patient is allergic, by giving the propeptans for all the specific proteins employed in the diet, forty-five minutes before each meal. If the symptoms improve on this

diet, one propeptan is withdrawn every second day, while the corresponding food is still ingested. If no allergic symptoms develop with this test, other foods are added to the diet (one each day) without the corresponding propeptan, until the food causing allergic symptoms is determined. If strict adherence to the propeptan diet does not cause improvement in the patient's symptoms and a food allergy is still suspected, systematic elimination from the diet of carbohydrates, then of fats, and finally of salts and of acids must be tried. If a protein food is found to be the cause of the allergic symptoms, the patient is told to eat the food or foods responsible for the symptoms once daily, and to take the specific propeptan or propeptans before this meal. The propeptan capsule is taken exactly forty-five minutes before the meal; and there must be an interval of four hours, or for small children, three hours between meals. If one capsule does not control the symptoms two or more capsules may be used for the first few days. In some very hypersensitive patients, even one capsule of propeptan causes symptoms; in such cases, treatment should be begun with 0.01 gm. or even 0.001 gm. of the propeptin diluted with sugar; and a correspondingly small amount of the corresponding food (1 to 5 gm.) given forty-five minutes later. To simplify treatment a mixed propeptan "polypropeptan" has been prepared, which contains 0.05 gm. each of the propeptans of twelve common food proteins. The meal following the administration of this capsule may then include any or all of these food proteins. This method of treatment has proved of definite value in the treatment of food allergies in children. An illustrative case in a boy 16 months of age is reported.



Bruns General Hospital Becomes Tuberculosis Center

THE Bruns General Hospital located in Santa Fe, N. M., under the command of Brigadier General Larry B. McAfee, M. C., has been designated as an Army center for the treatment of tuberculosis. The hospital is specially staffed with tuberculosis experts, and utilizes the most modern equipment and methods of treatment.

Bruns General Hospital was named in honor of Colonel Earl Harvey Bruns, M. C., who was one of the most distinguished phthisiologists in the history of the Army. As Chief of Medical Service at Fitzsimons General Hospital, Denver, Colo., which is also an Army tuberculosis center, he introduced much of the therapeutic practice now in effect there and trained many officers in the principles of tuberculosis control.

sometimes commercialized methods figure in more than half the cases; and a lot of harm is done by well-meaning folk. The child of the unmarried mother is increasingly likely to be the pawn in informal agreements arranged on a person-to-person basis by lawyers, doctors and independent social workers. These are not necessarily illegal adoptions, since the laws are lax and can be circumvented at times. Large sums of money are sometimes passed.

The recognized agencies are particularly concerned about adoptions soon after birth, the hazards of which are especially great.

It appears that about half the adoptions are being managed by private and not recognized sources. This is mainly because there are many more prospective homes than children for them.

It would seem that a State Commission might well look into this tragic tangle, with the aim of promoting suitable adoptions through proper controlling channels.

Compulsory Sickness Insurance in England

THE great majority of British physicians serve on the National Insurance panels. About 90 per cent of the workers are insured (all earning less than 420 pounds per annum). The doctors get about 12 per cent of the funds available

for disbursement while about 85 per cent goes for administrative overhead. A surplus of over 125 million pounds has been accumulated. The doctor sees about 30 panel patients a day. If a physician licensed to operate does an appendectomy he is paid one pound. General practitioners are strictly limited in the range of their ministrations and drug therapy. They can give about three minutes to a patient. About one-quarter of the work consists of house calls.

Now in order to take care of the dependents of the workers so-called clubs are organized by the doctors themselves at very low rates. This means another 30 patients a day added to the first 30 we mentioned (one can guess how much time is left for private patients, if any). But as the clubs are controlled by the doctors the "profits," such as they are, are relatively far greater than in the case of the state-controlled system.

We have great respect for the British profession but such a state of affairs as we have outlined ill befits its membership. We know what a splendid account these men are giving of themselves in medicine despite National Insurance but it only goes to show what can be done by badly circumstanced men of character. Will this always be so? Will as fine a breed of men seek entrance to the British profession?

Meanwhile the lengthening shadow of political medicine falls across our own shores. Its "success" obviously hinges upon the imposition of low standards of living and of wealth distribution for nearly all the people, as in England.



A New York Tuberculosis and Health Association Publication

THE New York Tuberculosis and Health Association has published the Directory of Affiliated Cardiac Clinics, compiled and issued annually by the Association's Heart Division.

According to Dr. J. Burns Amberson, president of the Association, Affiliated Cardiac Clinics are those which have met the standard requirements of the New York Heart Association and of the New York Tuberculosis and Health Association. There are 67 such clinics located in New York City; 36 in Manhattan, 7 in

the Bronx, 17 in Brooklyn and 7 in Queens.

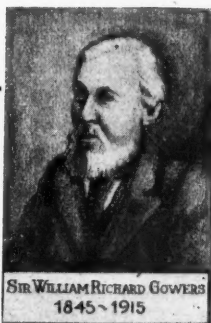
Listed in the Directory also are the vocational rehabilitation and employment services for cardiac patients in New York City, and the Cardiac Convalescent Homes available to residents of this city. These are: The Convalescent Home of the Burke Foundation in White Plains, Irvington House at Irvington-on-Hudson, Pelham Home for Children at Pelham Manor, St. Francis Sanatorium for Cardiac Children in Roslyn, Long Island, and the Speedwell Society at 446 East 88th Street, New York City.

Medical BOOK NEWS

Edited by

ALFRED E. SHIPLEY, M.D., Dr. P.H.

All books for review and communications concerning Book News should be addressed to the Editor of this department, 1313 Bedford Avenue, Brooklyn, 16, N. Y.



Classical Quotations

● The arteries may be of normal size upon the optic disc, and yet present very marked reduction in size on the retina, a little distance from the disc. An artery may leave the disc beside a vein to which it bears its normal proportion, and, after a little course, without giving off any visible branch, may diminish to one-half or one-third of the size of its accompanying vein.

SIR WILLIAM RICHARD GOWERS

The State of the Arteries in Bright's Disease. *Brit. Med. J.* 2:743-745, 1876.

Peptic Ulcer

The Treatment of Peptic Ulcer. By George J. Heuer, M.D. Philadelphia, J. B. Lippincott Co., [c. 1944]. 118 pages. 8vo. Cloth, \$3.00.

THIS ten year clinical and statistical study is valuable in that it helps to clarify some of the vexing questions connected with both the medical and surgical treatment of ulcer. Many of the conclusions reached by the statistical method coincide with those previously acquired by clinicians through the less exact approach of personal experience.

In this series, about half of the cases admitted to the wards for medical care eventually come to surgery.

Gastric resection (and moderate resection is advocated) shows more satisfactory results than gastro-enterostomy, though the immediate mortality is higher. It is urged that more cases with hemor-

rhage history be operated on before the serious hemorrhage develops.

The allusion to the jejunal patch operation arouses hopeful anticipation for future reports from this clinic.

This has the statistical proof which gastro-enterologists and surgeons have been waiting for to substantiate their decisions for or against surgery and their choice of procedure.

HENRY F. KRAMER

Behavior

Principles of Behavior. By Clark L. Hull. New York, D. Appleton-Century Company, [c. 1944]. 422 pages, illustrated. 8vo. Cloth, \$4.00.

THE author is Professor of Psychology at the Institute of Human Relations, Yale University and the material presented in this book is the outgrowth of his work at the Institute. It attempts to present objectively the principles of behavior of higher animals.

Primarily it is a book on neurophysiology and psychology which admirably encompasses the extent of our knowledge in this field. Often the material is of a highly technical nature which necessitates the use of equations which tend to confuse the uninitiated. However, there are explanatory summaries at the end of each chapter.

Undoubtedly the book will be well received by the specialist in this field but will hardly interest the general medical man.

J. L. ABRAMSON

The New Dorland

The American Illustrated Medical Dictionary. A Complete Dictionary of the Terms Used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, etc. By W. A. Newman Dorland, M.D., Lt. Col., M.R.C., U.S.A. 20th Edition. Revised. Philadelphia, W. B. Saunders Company, [c. 1944]. 1668 pages, illustrated. 8vo. Cloth, Plain, \$7.00. Thumb-indexed, \$7.50.

THIS is the twentieth edition of Dorland's standard work. None of the

hundreds of new words which have come into use since the nineteenth edition was issued seem to have been overlooked. War medicine and surgery are adequately covered. Justice is done to the new synthetics. The American Medical Association's Standard Nomenclature is followed. The "gallery" of portraits now numbers 240.

ARTHUR C. JACOBSON

Clinical Diagnosis

Symptoms and Signs in Clinical Medicine, An Introduction to Medical Diagnosis. By E. Noble Chamberlain, M.D. 3rd Edition. Baltimore, The Williams and Wilkins Company, [c. 1943]. 456 pages, illustrated. 8vo. Cloth, \$8.00.

THE third edition of this useful and valuable volume has added to the clinical character of the book such laboratory and other mechanical means of arriving at a diagnosis as seemed necessary in completing an accurate diagnosis. It is recognized that clinical methods only, however well developed, cannot complete the picture of diseased conditions. This is an excellent work for students and practitioners, complete, accurate, well written, and well presented. It is clearly printed, on the finest paper, with 346 illustrations which show well the pathological conditions.

This book is a valuable one for reference in the library of any practitioner of medicine.

HENRY M. MOSES

Harry Friedenwald's Collected Writings

The Jews and Medicine—Essays. By Harry Friedenwald, M.D. [In two volumes]. Baltimore, Johns Hopkins Press, [c. 1944]. 817 pages illustrated. 8vo. Cloth, \$3.75 per vol.; \$7.50 per set.

THESE two volumes consist of essays written over a number of years. Some have been published previously, some have never appeared before. This wonderful contribution to medical history comes from the pen of the illustrious ophthalmologist and medical historian, Harry Friedenwald. The author, an ardent bibliophile, has an extraordinary collection of some of the rarest works related to the medical sciences and the allied fields. His library is the envy of all book-lovers and historians and represents the labor he expended in this "hobby" for almost fifty years.

The forty-two essays contained in these two volumes bring to the reader the gems of Dr. Friedenwald's collection. Each article is more intriguing than the other. One cannot set these books aside without reluctance once they are opened. They are inspiring and create in the reader a pro-

found interest in the subject. No physician can afford to miss reading this masterpiece from the pen of a great humanist.

CHARLES SOLOMON

Membrane Permeability

The Permeability of Natural Membranes. By Hugh Dawson D.Sc. and James Frederic Danielli, D.Sc. New York, The Macmillan Company, [c. 1943]. 361 pages, illustrated. 8vo. Cloth, \$4.75.

THIS book is a timely addition to the literature on biophysics and physiology. The study of the natural membranes by the authors is authoritative. The material compiled in reference to permeability of cell membranes is a very important link in the nutrition and metabolism of the cell and tissue.

To the physicians chapter XX on the permeability of the various components of the kidney are of special clinical value.

This book is recommended for those interested in metabolism.

MORRIS ANT

For the Prospective Mother

Safe Convey. The Expectant Mother's Handbook. By William J. Carrington, M.D. Philadelphia, J. B. Lippincott Company, [c. 1944]. 256 pages. 8vo. Cloth, \$2.50.

AN excellent handbook which the physician may well recommend to his patients,—and women ask us for such a book more and more often. Sanely told, in simple homely style, this attractively bound little book deserves to become popular.

CHARLES A. GORDON

Women in the Healing Art

Women Healers in Medieval Life and Literature. By Muriel Joy Hughes. New York, King's Crown Press, [c. 1943]. 180 pages. 8vo. Paper, \$2.00.

THIS study is concerned with the woman healer and her practices from the eleventh through the fifteenth century, with special emphasis upon the English woman.

The subjects considered in this scholarly monograph are: Some famous women healers in literature; The Layman's medicine; Lay women healers; Academic medicine; Women practitioners; Medieval midwives; Medieval nurses.

Much of the responsibility of medical aid in the Middle Ages fell upon women. Their work was a mixture of superstition and practical wisdom and dexterity in administering treatment by means of herbal medicine and home remedies. Although they were excluded from the front ranks

of medicine and, with few exceptions, were not admitted to medical schools, their skill in healing, according to the standards of the time, was sufficient to win them the respect of their contemporaries.

WILLIAM LIEBERMAN

Kinesiology

Analysis of Human Motion. A Textbook in Kinesiology. By M. Gladys Scott. New York, F. S. Crofts & Company, [c. 1942]. 388 pages, illustrated. 8vo. Cloth, \$3.90.

THIS book presents a clear and simple analysis of the physical and physiological phenomena in the motion of the human body.

Although it is intended as a text to be used by students of physical education, many of its sections, particularly those dealing with the activities in sports and gymnastics, will be found useful by school and college physicians.

ARTHUR SHAPIRO

Dietary Treatment

Applied Dietetics. The Planning and Teaching of Normal and Therapeutic Diets. By Frances Stern. 2nd Edition. Baltimore, The Williams & Wilkins Company, [c. 1943]. 265 pages, 4to. Cloth, \$4.00.

IN this edition Frances Stern seems to have caught up with medical interpretation of dietetics.

Part 1. Chapter three is to the reviewer the most important as it relates to the discussion of construction of the Therapeutic diet. Here every physician will find that the dietitian is medically minded.

Part 2. The tables which amplify diets are collected from sources well known.

Part 3. Dietary outlines are well planned and described and may be considered the best part of the book.

MORRIS ANT

Strecker's Mental Disorders

Fundamentals of Psychiatry. By Edward A. Strecker, M.D. 2nd Edition. Philadelphia, J. B. Lippincott Co., [c. 1943]. 219 pages, illustrated. 12mo. Cloth, \$3.00.

THE general practitioner has long felt the need of a concise, readily understandable, handy-sized book relative to the practical considerations to be grasped in the management of psychoneurotic and psychotic patients. This is it!

Dr. Strecker, out of a long experience of teaching, has made clear and attractive, not only to the medical student and nurse, but also to all those bent upon gaining an appreciation of the importance and opportunities of psychiatry today in the light

of its historical past and its tremendous importance in war time.

Commendable emphasis is given to recent methods of treatment, not only shock therapy and narco-synthesis, but also to other techniques which have given new impetus to the whole field of psychotherapy.

No one seeking a sound résumé of psychiatry can afford not to have this book within ready reach.

FREDERICK L. PATRY

New Edition of Rose's Nutrition

Rose's Foundations of Nutrition. Revised by Grace Macleod, Ph.D. and Clara Mae Taylor, Ph.D. New York, The Macmillan Company, [c. 1944]. 594 pages, illustrated. 8vo. Cloth, \$3.75.

DR. MACLEOD and Dr. Taylor have prepared this fourth edition of Mary Swartz Rose's book. They follow faithfully in her tradition of practical and crystal clear nutrition teaching with the highest possible technical accuracy.

This text is designed mainly to meet the needs of such groups as beginners in the study of dietetics, nurses, etc. It considers the body's nutrition needs, and the contributions made by each food element. Following this, there are chapters on the construction of adequate diets with special attention given to children in various age groups and family groups. There is an appendix consisting of seventeen valuable tables, including market lists of meals on low, moderate and liberal budgets, tips on buying and using food, etc., as well as the standard tables of food values, weight-height-age, etc.

Rose's Foundations of Nutrition is reliable, complete and up-to-date. It is highly recommended both as a teaching text and as a reference.

ETHEL PLOTZ BERMAN

Schizophrenic Thought

Conceptual Thinking of Schizophrenia. By Eugenia Hanfmann, Ph.D. and Jacob Kasamin, M.D., [Nervous and Mental Disease Monographs #67]. N. Y., Nervous and Mental Disease Monographs, [c. 1942]. 115 pages. 8vo. Cloth, \$2.50.

THE book is a monograph on the conceptual thinking of Schizophrenia. It lays emphasis upon the work of a Russian psychologist Vigotsky who has presented a test for arriving at the definite analysis of the thinking difficulties encountered in this serious mental disorder. This book will appeal to psychiatrists who are especially interested in this subject.

IRVING J. SANDS

Latin American Medicine

Aesculapian in Latin America. By Aristides A. Moll. Philadelphia, W. B. Saunders Company, [c. 1944]. 639 pages, illustrated. 8vo. Cloth, \$7.00.

ANYONE interested in Latin American medicine will find this volume crowded with data of every variety, from colonial times to the present. Because of the immense ground the author has covered, the book suffers from sketchiness. The reviewer feels that had the highlights been elaborated, the value of the book would have been tremendously enhanced. As it is, all personalities appear almost of one height and importance and the book becomes too much like a series of medical directories. An excellent chronology for medicine in Latin America, and related and general history in the world, is a valuable appendage.

MEYER A. RABINOWITZ

Visual Apparatus of Vertebrates

Vertebrate Photoreceptors. By Samuel R. Detwiler. New York, The Macmillan Company, [c. 1943]. 184 pages, illustrated. 8vo. Cloth, \$4.00.

THE title of this work is rather awe inspiring until we realize that the subject reaches us in our every day practice. The author points out that it follows the appearance of two rather elaborate vol-

umes, that of Polyak on the retina and that of Walls on comparative ophthalmology. The reviewer agrees, however, that this volume of 184 pages is a valuable addition from the viewpoint of the ophthalmologist.

The material is so arranged and presented that the book will doubtless be included as a text in the training of the ophthalmic resident. Hardly a day goes by when some question does not arise which requires an understanding of the ocular structure and functions of the lower forms of vertebrate life. Every teaching institution has a more or less complete collection of specimens of the eyes of the commoner animals. This material is apt to be neglected unless it can be introduced in the teaching program by a text such as Detwiler has supplied. Professor Detwiler has a pleasing method of presenting his subject. The illustrations, diagrams and tabulations are clear and appropriate, and the appended bibliography is valuable to those interested in pursuing a topic in more detail.

All in all, the reviewer feels that this volume is very much worth while and a distinct addition to the library of the ophthalmologist.

JOHN N. EVANS

BOOKS RECEIVED

for review are promptly acknowledged in this column; we assume no other obligation in return for the courtesy of those sending us the same. In most cases, review noted will be promptly published shortly after acknowledgment of receipt has been made in this column.

Textbook of Gynecology. By Emil Novak, M.D., Second Edition. Baltimore, The Williams & Wilkins Co., [c. 1944]. 708 pages, illustrated. 8vo. Cloth, \$8.00.

Segmental Neuralgia in Painful Syndromes. By Bernard Judovich, M.D., and William Bates, M.D. Philadelphia, F. A. Davis Co., [c. 1944]. 313 pages, illustrated. 8vo. Cloth, \$5.00.

Fundamentals of Internal Medicine. By Wallace M. Yater, M.D. Second Edition. New York, D. Appleton-Century Co., [c. 1944]. 1204 pages, illustrated. 8vo. Cloth, \$10.00.

Manual of Urology. By R. M. LeComte, M.D. 3rd Edition. Baltimore, The Williams & Wilkins Co., [c. 1944]. 305 pages, illustrated. 8vo. Cloth, \$4.00.

Clinical Urology. By Oswald Swinney Lowesley, M.D. and Thomas Joseph Kirwin, M.D. [In two volumes]. 2nd Edition. Baltimore, The Williams & Wilkins Co., [c. 1944]. 1,769 pages, illustrated. 8vo. Cloth, \$10.00 per set.

Handbook of Diagnosis & Treatment of Venereal Diseases. By A. E. W. McLachlan. Baltimore, The Williams & Wilkins Co., [c. 1944]. 364 pages, with 159 illustrations, 19 in color. 16mo. Cloth, \$5.00.

Diseases of the Chest. By Robert Coope, M.D. Baltimore, The Williams & Wilkins Co., [c. 1944]. 524 pages, illustrated. 8vo. Cloth, \$7.50.

Metastases, Medical and Surgical. By Malford W. Thewlis, M.D. Charlotte, N. C., Charlotte Medical Press, [c. 1944]. 230 pages, illustrated. 4to. Cloth, \$5.00.

Diseases of the Digestive System. Edited by Sidney A. Fortis, M.D. 2nd Edition. Philadelphia, Lea & Febiger, [c. 1944]. 932 pages, illustrated. 8vo. Cloth, \$11.00.

Malaria: Its Diagnosis, Treatment and Prophylaxis. By Colonel William N. Bispham, M.D., U.S.A., Retired. Baltimore, Williams & Wilkins Co., [c. 1944]. 197 pages, illustrated. 8vo. Cloth, \$3.50.